

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

a521
R44A7
02

United States
Department of
Agriculture

Agricultural
Research
Service

ARS-58

December 1986

A Bibliography of Maize Weevils, Sitophilus zeamais Motschulsky (Coleoptera: Curculionidae)

100-11510
Agric. Res. Serv.
Bibliography
1986
98, 10, 1986
REF 31 352
SAC/100-11510
02

ABSTRACT

Throne, James E. 1986. A Bibliography of Maize Weevils, *Sitophilus zeamais* Motschulsky (Coleoptera: Curculionidae). U.S. Department of Agriculture, Agricultural Research Service, ARS-58, 32 pp.

This bibliography is a listing of publications about maize weevils, with citations grouped by subject matter.

KEYWORDS: Bibliography, maize weevils, *Sitophilus zeamais*.

CONTENTS

Bibliography 3
Attractants and pheromones 3
Biology and ecology 3
Control 8
 Chemical 8
 Fumigation 12
 Growth regulators 14
 Host plant resistance 14
 Miscellaneous 17
 Natural enemies 18
 Natural products 18

Packaging 19
Radiation 19
 Resistance to pesticides 20
Damage to stored products 22
Disease transmission 22
General papers 22
Morphology and physiology 23
Mycetomal symbionts 24
Surveys 24
Taxonomy 26
Author index 28

Copies of this publication may be purchased from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

ARS has no additional copies for free distribution.



A Bibliography of Maize Weevils, Sitophilus zeamais Motschulsky
(Coleoptera: Curculionidae)

Compiled by James E. Throne^{1/}

Maize weevils, Sitophilus zeamais Motschulsky (Coleoptera: Curculionidae), are important pests of stored products throughout most of the world. Although they are primarily pests of stored grain, they have been found in apples, barley, beans, cashews, cassava, cocoa, corn, millet, oats, peanuts, rice, sorghum, sunflower, tomatoes, wheat, and yams. Maize weevils have been reported in Angola, Antigua, Argentina, Australia, Bahrain, Belize, Benin, Botswana, Brazil, Burma, Canada, Central African Republic, Colombia, Costa Rica, Czechoslovakia, Easter Island, Egypt, El Salvador, Ethiopia, French Guiana, Gambia, German Democratic Republic, German Federal Republic, Ghana, Greece, Guatemala, Guyana, India, Indonesia, Israel, Italy, Jamaica, Japan, Kenya, Kuwait, Libya, Madagascar, Malawi, Malaysia, Mexico, Morocco, Mozambique, New Caledonia, New Guinea, Nicaragua, Nigeria, People's Republic of China, Peru, Philippines, Portugal, Republic of China, Saudi Arabia, Senegal, Sierra Leone, Singapore, Somalia, South Africa, South Korea, Soviet Union, Sri Lanka, Swaziland, Tanzania, Trinidad, Turkey, Uganda, United Kingdom, United States, Uruguay, Yugoslavia, Zambia, and Zimbabwe.

Maize weevils and closely related rice weevils, S. oryzae (L.), are similar in external morphology. There has been some confusion as to whether they are two distinct species (Boudreaux 1969).

Prior to 1944, most workers considered both species to be rice weevils, S. oryzae. It is not possible to determine which species was used in most studies published before 1944. Between 1944 and 1959, both were considered to be strains of the rice weevil, S. oryzae (Birch 1944, Richards 1944). Maize weevils were referred to as "the large strain" and rice weevils as "the small strain" of S. oryzae. Most papers published during this period identified the strain of S. oryzae used in the study. In 1959, maize weevils and rice weevils were again separated into two species based on morphological and biological differences (Floyd and Newsom 1959). However, the "large strain" was given the name S. oryzae, and S. sasakii was applied to the "small strain." Kuschel (1961, 1978) established the correct names for the two species.

Morrison (1964) published an annotated bibliography relevant to the ecology of maize weevils. Longstaff (1981) reviewed the biology of maize weevils, rice weevils, and granary weevils, S. granarius (L.), and included an annotated bibliography on the biology of the three species. The present work is intended to be a complete bibliography of maize weevils. It should assist entomologists in obtaining information on maize weevils, and also it emphasizes those areas requiring more research. Control of maize weevils with chemicals and resistant plant varieties has been intensively investigated. However, this bibliography emphasizes that little work has been done to develop methods for sampling maize weevils to estimate population levels, to develop economic threshold levels for maize weevils, or to use natural enemies in control strategies.

^{1/}Research entomologist, Stored-Product Insects Research and Development Laboratory, Agricultural Research Service, U.S. Department of Agriculture, 3401 Edwin St., P.O. Box 22909, Savannah, GA 31403.

Most articles published since the original description of the species in 1855 through 1985 have been included here except unpublished theses and dissertations. Bibliographic sources consulted were the Review of Applied Entomology - series A (RAE) for 1965-85, the Bibliography of Agriculture (BA) for 1945-68, and the literature citations in papers. All articles

except those followed by a citation in a bibliographic source were available to the compiler. Citations have been divided into general subject areas; however, many include additional information on subjects other than the categories in which they are listed. A few citations are given in more than one subject area.

BIBLIOGRAPHY

ATTRACTANTS AND PHEROMONES

Burkholder, W. E., and M. Ma. 1985. Pheromones for monitoring and control of stored-product insects. Annual Review of Entomology 30: 257-272.

Honda, H., I. Yamamoto, and R. Yamamoto. 1969. Attractant for rice weevil, Sitophilus zeamais Motschulsky (Coleoptera: Rhynchophoridae), from rice grains. I. Bioassay method for the attractancy of rice grains to rice weevils. Applied Entomology and Zoology 4: 23-31.

Honda, H., I. Yamamoto, and R. Yamamoto. 1969. Attractant for rice weevil, Sitophilus zeamais Motschulsky (Coleoptera: Rhynchophoridae), from rice grains. II. Fractionation of rice grains and the nature of the crude attractive fraction. Applied Entomology and Zoology 4: 32-41.

Maeshima, K., N. Hayashi, T. Murakami, F. Takahashi, and H. Komae. 1985. Identification of chemical oviposition stimulants from rice grain for Sitophilus zeamais Motschulsky (Coleoptera, Curculionidae). Journal of Chemical Ecology 11: 1-9.

Ohsawa, K., K. Oshima, I. Yamamoto, and R. Yamamoto. 1970. Attractant for the rice weevil, Sitophilus zeamais Motschulsky (Coleoptera: Rhynchophoridae), from rice grains. III. A new type olfactometer for rice weevils. Applied Entomology and Zoology 5: 121-125.

Phillips, J. K., C. A. Walgenbach, J. A. Klein, W. E. Burkholder, N. R. Schmuff, and H. M. Fales. 1985. (R*, S*)-5-hydroxy-4-methyl-3-heptanone male produced aggregation pheromone of Sitophilus oryzae (L.) and S. zeamais Motsch. Journal of Chemical Ecology 11: 1263-1274.

Schmuff, N. R., J. K. Phillips, W. E. Burkholder, H. M. Fales, C. W. Chen, P. P. Roller, and M. Ma. 1984. The

chemical identification of the rice weevil and maize weevil aggregation pheromone. Tetrahedron Letters 25: 1533-1534.

Tipping, P. W., K. L. Mikolajczak, J. G. Rodriguez, B. W. Zilkowski, and D. E. Legg. 1986. Attraction of Sitophilus oryzae (L.) and S. zeamais Motsch. (Coleoptera: Curculionidae) to extracts from two corn genotypes. Journal of the Kansas Entomological Society 59: 190-194.

Walgenbach, C. A., J. K. Phillips, D. L. Faustini, and W. E. Burkholder. 1983. Male-produced aggregation pheromone of the maize weevil, Sitophilus zeamais, and interspecific attraction between three Sitophilus species. Journal of Chemical Ecology 9: 831-841.

Yamamoto, I., and R. Yamamoto. 1970. Host attractants for the rice weevil and the cheese mite. Pages 331-345 in D. L. Wood, R. M. Silverstein, and M. Nakajima, eds. Control of insect behavior by natural products. Academic Press, New York.

Yamamoto, R., K. Ohsawa, H. Honda, and I. Yamamoto. 1974. Attractants for rice weevil, Sitophilus zeamais Motschulsky, isolated from corn grains. Pages 663-667 in F. Coulston and F. Korte, eds. Pesticides. Georg Thieme Publishers, Stuttgart.

BIOLOGY AND ECOLOGY

Arakaki, N., and F. Takahashi. 1982. Density regulating mechanism of the larvae of rice weevil in a rice grain [in Japanese, English summary]. Kontyu 50: 588-598.

Arakaki, N., and F. Takahashi. 1982. Oviposition preference of rice weevil, Sitophilus zeamais Motschulsky (Coleoptera: Curculionidae), for unpolished and polished rice [in Japanese, English summary]. Japanese Journal of Applied Entomology and Zoology 26: 166-171.

Ayertey, J. N. 1979. An unusual mortality of Sitophilus zeamais Mots. caused by Sitotroga cerealella (Oliv.) in mixed laboratory cultures. Pages 328-337 in Proceedings of the Second International Working Conference on Stored-Product Entomology. Ibadan, Nigeria. September 10-16, 1978.

Ayertey, J. N. 1979. The growth of single and mixed laboratory populations of Sitophilus zeamais Motschulsky and Sitotroga cerealella (Olivier) on stored maize. Researches on Population Ecology 21: 1-11.

Ayertey, J. N. 1980. Elimination of Sitotroga cerealella (Olivier) by Sitophilus zeamais Motschulsky from mixed laboratory cultures on maize. Researches on Population Ecology 22: 101-116.

Ayertey, J. N. 1981. Locomotor activity of Sitophilus zeamais and Sitotroga cerealella on maize. Entomologia Experimentalis et Applicata 29: 19-28.

Baker, J. E., and J. M. Mabie. 1973. Growth responses of larvae of the rice weevil, maize weevil, and granary weevil on a meridic diet. Journal of Economic Entomology 66: 681-683.

Bennett, R. G. 1970. A method of obtaining free immature stages of Sitophilus zeamais Motschulsky (Col., Curculionidae). Entomologist's Monthly Magazine 105: 199.

Birch, L. C. 1944. Two strains of Calandra oryzae L. Australian Journal of Experimental Biology and Medical Science 22: 271-275.

Birch, L. C. 1946. The influence of food on the size of two strains of Calandra oryzae L. Australian Journal of Experimental Biology and Medical Science 24: 123-125.

Birch, L. C. 1953. Experimental background to the study of the distribution and abundance of insects. I. The influence of temperature, moisture and food on the innate capacity for increase of three grain beetles. Ecology 34: 698-711.

Birch, L. C. 1953. Experimental background to the study of the distribution and abundance of insects. II. The relation between innate capacity for increase in numbers and the abundance of three grain beetles in experimental populations. Ecology 34: 712-726.

Birch, L. C. 1953. Experimental background to the study of the distribution and abundance of insects. III. The relation between innate capacity for increase and survival of different species of beetles living together on the same food. Evolution 7: 136-144.

Birch, L. C. 1954. Experiments on the relative abundance of two sibling species of grain weevils. Australian Journal of Zoology 2: 66-74.

Bishara, S. I. 1967. Factors involved in recognition of the oviposition sites of three species of Sitophilus (Coleoptera: Curculionidae). Bulletin de la Societe Entomologique d'Egypte 51: 71-94.

Bishara, S. I. 1968. Comparison of some aspects of flight activity of Sitophilus zea-mais Mots. and Sitophilus oryzae L. Bulletin de la Societe Entomologique d'Egypte 52: 477-500.

Bishara, S. I. 1968. The climbing ability of Sitophilus weevils on smooth glass surface (Coleoptera: Curculionidae). Bulletin de la Societe Entomologique d'Egypte 52: 213-227.

Boles, H. P. 1975. The Arkansas laboratory strain of the maize weevil. Bulletin of the Entomological Society of America 21: 165-168.

Chesnut, T. L. 1972. Flight habits of the maize weevil as related to field infestation of corn. Journal of Economic Entomology 65: 434-435.

Chesnut, T. L., and W. A. Douglas. 1971. Competitive displacement between natural populations of the maize weevil and the Angoumois grain moth in Mississippi. Journal of Economic Entomology 64: 864-868.

Coombs, C. W., and J. E. Porter. 1986. Some factors affecting the infestation of wheat and maize by Sitophilus oryzae (L.) and Sitophilus zeamais Mots. (Coleoptera: Curculionidae). Journal of Stored Products Research 22: 33-41.

Cowley, R. J., D. C. Howard, and R. H. Smith. 1980. The effect of grain stability on damage caused by Prostephanus truncatus (Horn) and three other beetle pests of stored maize. *Journal of Stored Products Research* 16: 75-78.

Davis, R., and R. E. Bry. 1985. Sitophilus granarius, Sitophilus oryzae, and Sitophilus zeamais. Pages 287-289 in P. Singh and R. F. Moore, eds. *Handbook of insect rearing*. Volume 1. Elsevier Science Publishers B. V., Amsterdam.

Dix, D. E., and J. N. All. 1985. Invasion patterns and sex-ratio dynamics of the maize weevil (Coleoptera: Curculionidae) infesting field corn. *Journal of Economic Entomology* 78: 1072-1075.

Dobie, P. 1978. A simple curve describing the development pattern of some beetles breeding on stored products. *Journal of Stored Products Research* 14: 41-44.

Floyd, E. H. 1971. Relationship between maize weevil infestation in corn at harvest and progressive infestation during storage. *Journal of Economic Entomology* 64: 408-411.

Fourie, G. J. J. 1967. The influence of certain factors on the fecundity of Sitophilus oryzae (L.). *South African Journal of Agricultural Science* 10: 331-344.

Gelosi, A., and L. Arcozzi. 1983. Maize weevil (Sitophilus zea-mays Motschulksy) [in Italian]. *Informatore Fitopatologico* 33: 27-30. (RAE 72: 6064)

Giles, P. H. 1969. Observations in Kenya on the flight activity of stored products insects, particularly Sitophilus zeamais Motsch. *Journal of Stored Products Research* 4: 317-329.

Giles, P. H., and F. Ashman. 1971. A study of pre-harvest infestation of maize by Sitophilus zeamais Motsch. (Coleoptera, Curculionidae) in the Kenya highlands. *Journal of Stored Products Research* 7: 69-83.

Hagstrum, D. W. 1984. The population dynamics of stored-products insect pests. Pages 10-19 in *Proceedings of the Third International Working Conference on Stored-Product Entomology*. Manhattan, Kansas, USA. October 23-28, 1983.

Hodges, R. J., H. Halid, D. P. Rees, J. Meik, and J. Sarjono. 1985. Insect traps tested as an aid to pest management in milled rice stores. *Journal of Stored Products Research* 21: 215-229.

Hoover, D. L., and E. H. Floyd. 1965. A study of the capability of the rice weevils Sitophilus sasakii and S. oryzae to reproduce parthenogenetically. *Annals of the Entomological Society of America* 58: 565-567.

Howe, R. W. 1952. The biology of the rice weevil, Calandra oryzae (L.). *Annals of Applied Biology* 39: 168-180.

Hsieh, F. K., and J. S. Hwang. 1978. Effects of husk perfectness of rough rice on the oviposition and reproduction of Sitophilus zeamais Motschulsky [in Chinese, English summary]. *Plant Protection Bulletin, Taiwan* 20: 291-301. (RAE 68: 2086)

Hsieh, F. K., J. S. Hwang, L. M. Hung, and S. S. Kao. 1978. Effects of relative humidity on moisture content of stored grains and insect damage [in Chinese, English summary]. *Plant Protection Bulletin, Taiwan* 20: 330-337. (RAE 68: 3132)

Hwang, J. S., F. K. Hsieh, and K. S. Kung. 1983. Influences of temperature and relative humidity on the development and reproduction of the maize weevil, Sitophilus zeamais Motschulsky [in Chinese, English summary]. *Plant Protection Bulletin, Taiwan* 25: 41-52.

Imura, O. 1979. The extraction of insects of stored products from samples using a modified Tullgren funnel [in Japanese, English summary]. *Japanese Journal of Applied Entomology and Zoology* 23: 134-140. (RAE 68: 3668)

Khan, M. A. 1983. Effect of relative humidity on adults of 10 different species of stored product beetles. *Zeitschrift für Angewandte Entomologie* 95: 217-227.

Kidoguchi, J. 1978. Reproduction of maize and rice weevils [Sitophilus zeamais Motsch. and S. oryzae (L.)] on rough rice at various water contents [in Japanese]. Japanese Journal of Applied Entomology and Zoology 22: 207-209. (RAE 67: 1894)

Kiritani, K. 1956. On the local distribution of two allied species of the rice weevil, Calandra oryzae and C. sasakii. Japanese Journal of Applied Zoology 21: 74-77. (BA 20: 95708)

Kiritani, K. 1959. Flying ability and some of the characters associated with it in Calandra. Japanese Journal of Ecology 9: 69-74. (BA 24: 14162)

Kiritani, K. 1965. Biological studies on the Sitophilus complex (Coleoptera: Curculionidae) in Japan. Journal of Stored Products Research 1: 169-176.

Kiritani, K. 1965. Studies on the biology of Sitophilus species. Pages 623-624 in Proceedings of the XIIth International Congress of Entomology. London. 8-16 July, 1964.

Kiritani, K., H. Matsuzawa, and N. Atarasi. 1957. The field infestation of standing crops by the rice weevil, Calandra oryzae L., in Japan [in Japanese, English summary]. Botyu-Kagaku 22: 241-247.

Kirk, V. M. 1965. Some flight habits of the rice weevil. Journal of Economic Entomology 58: 155-156.

LeCato, G. L., and R. T. Arbogast. 1974. Multiplication by stored-product Coleoptera on high lysine corn. Journal of the Kansas Entomological Society 47: 161-165.

Longstaff, B. C. 1981. Biology of the grain pest species of the genus Sitophilus (Coleoptera: Curculionidae): a critical review. Protection Ecology 2: 83-130.

Maceljski, M. 1971. The effects of changes in environment on the occurrence of some agricultural pests in Yugoslavia [in Serbo-Croat, English summary]. Acta Entomologica Jugoslavica 7: 41-49. (RAE 62: 417)

Maceljski, M., and Z. Korunic. 1973. Contribution to the morphology and ecology of Sitophilus zeamais Motsch. in Yugoslavia. Journal of Stored Products Research 9: 225-234.

McFarlane, J. A. 1968. The productivity and rate of development of Sitophilus oryzae (L.) (Coleoptera, Curculionidae) in various parts of Kenya. Journal of Stored Products Research 4: 31-51.

Meagher, R. L., Jr., C. Reed, and R. B. Mills. 1982. Development of Sitophilus zeamais and Tribolium castaneum in whole, cracked, and ground pearl millet. Journal of the Kansas Entomological Society 55: 91-94.

Morrison, E. O. 1964. Effect of habitat disturbance on a rice weevil population (Sitophilus zea-mais Mots.). Texas Journal of Science 16: 96-100.

Morrison, E. O. 1964. The effect of particle size of sorghum grain on development of the weevil Sitophilus zea-mais. Journal of Economic Entomology 57: 390-391.

Musgrave, A. J., G. C. Ashton, and R. Homan. 1963. Quantitative and qualitative effects of temperature and type of grain on populations of Sitophilus (Coleoptera: Curculionidae) and on their mycetomal microorganisms. Canadian Journal of Zoology 41: 1245-1261.

Nishigaki, J. 1958. The effects of the water content of rice and the temperature on the development and the reproductive rate of the geographical strains of the two rice weevils, Calandra oryzae L. and C. sasakii Takahashi [in Japanese, English summary]. Japanese Journal of Applied Entomology and Zoology 2: 264-270.

Okelana, F. A., and F. N. C. Osuji. 1985. Influence of relative humidity at 30°C on the oviposition, development and mortality of Sitophilus zeamais Motsch. (Coleoptera: Curculionidae) in maize kernels. Journal of Stored Products Research 21: 13-19.

Powell, J. D., and E. H. Floyd. 1960. The effect of grain moisture upon development of the rice weevil in green corn. Journal of Economic Entomology 53: 456-458.

Proctor, D. L. 1972. A technique for marking stored product insects when

studying dispersion. *Journal of Stored Products Research* 8: 233-234.

Richards, O. W. 1944. The two strains of the rice weevil, Calandra oryzae (L.) (Coleopt., Curculionidae). *Transactions of the Royal Entomological Society of London* 94: 187-200.

Richards, O. W. 1947. Observations on grain-weevils, Calandra (Col., Curculionidae). I. General biology and oviposition. *Proceedings of the Zoological Society of London* 117: 1-43.

Rossetto, C. J., H. V. de Arruda, and W. J. da Silva. 1975. The placing of eggs of Sitophilus zeamais Motschulsky (Coleoptera, Curculionidae) on husked and unhusked maize [in Portuguese, English summary]. *Anais da Sociedade Entomologica do Brasil* 4: 21-27. (RAE 65: 4934)

Santhoy, O., and B. Morallo-Rejesus. 1975. The developmental rate, body weight, and reproductive capacity of Sitophilus zeamais Motsch. reared on three natural hosts. *Philippine Entomologist* 2: 311-321.

Satomi, H. 1955. A comparative study of some physiological and ecological characters of the rice weevils, Calandra oryzae L. and C. sasakii Takahashi collected from different districts of the world [in Japanese, English summary]. *Botyu-Kagaku* 20: 55-61.

Satomi, H. 1957. A comparative study on some physiological and ecological characters of the rice weevils, Calandra oryzae L. and C. sasakii Takahashi collected from different districts of the world [in Japanese, English summary]. *Japanese Journal of Applied Entomology and Zoology* 1: 106-112. (BA 22: 17237)

Satomi, H. 1960. Differences in some physiological and ecological characters between two allied species of the rice weevils, Calandra oryzae and C. sasakii collected from different districts of the world. *Japanese Journal of Ecology* 10: 218-226.

Segrove, F. 1951. Oviposition behaviour in the two strains of the rice weevil, Calandra oryzae Linn. (Coleopt., Curculionidae). *Journal of Experimental Biology* 28: 281-297.

Sharifi, S. 1972. Oviposition site and egg plug staining as related to development of two species of Sitophilus in wheat kernels. *Zeitschrift für Angewandte Entomologie* 71: 428-431.

Sharifi, S., and R. B. Mills. 1971. Radiographic studies of Sitophilus zeamais Mots. in wheat kernels. *Journal of Stored Products Research* 7: 195-206.

Singh, S. R., and D. A. Wilbur. 1966. Effects of temperature, age, and sex on longevity of three adult populations of the rice weevil complex. *Journal of the Kansas Entomological Society* 39: 569-572.

Smith, L. B. 1984. Control of stored grain insects with low temperatures. Pages 44-49 in *Proceedings of the thirty-first annual meeting, Canadian Pest Management Society, Winnipeg, Manitoba, 20-22 August, 1984*. (RAE 73: 6511)

Soderstrom, E. L. 1960. Recognition and duration of larval instars of the rice weevil and the granary weevil. *Journal of the Kansas Entomological Society* 33: 157-161.

Soderstrom, E. L. 1962. Studies on longevity and competition among the rice weevil complex. *Proceedings of the North Central Branch of the Entomological Society of America* 17: 23-25.

Soderstrom, E. L., and D. A. Wilbur. 1965. Variations in size and weight of three geographical populations of the rice weevil complex. *Journal of the Kansas Entomological Society* 38: 1-9.

Soderstrom, E. L., and D. A. Wilbur. 1966. Biological variations in three geographical populations of the rice weevil complex. *Journal of the Kansas Entomological Society* 39: 32-41.

Spratt, E. C. 1975. Some effects of the carbon dioxide absorbency of humidity controlling solutions on the results of life history experiments with stored products insects. *Journal of Stored Products Research* 11: 127-134.

Strong, R. G., D. E. Sbur, and G. J. Partida. 1967. Rearing stored-product insects for laboratory studies: lesser grain borer, granary weevil, rice weevil, Sitophilus zeamais, and Angoumois grain moth. *Journal of Economic Entomology* 60: 1078-1082.

Takahashi, F., and H. Mizuno. 1982. Infestation of rice weevils in rice grain in relation to drying procedures after harvest and the form of the grain at different stages in the milling process. *Environment Control in Biology* 20: 9-16.

Taylor, T. A. 1971. On the flight activity of Sitophilus zeamais Motsch. (Coleoptera, Curculionidae) and some other grain-infesting beetles in the field and a store. *Journal of Stored Products Research* 6: 295-306.

Ungsunantiwat, A., and R. B. Mills. 1976. Effect of culture media on numbers of progeny of grain weevils (Sitophilus spp.) [Abstract]. *Journal of the Kansas Entomological Society* 49: 566.

Ungsunantiwat, A., and R. B. Mills. 1979. Influence of medium and physical disturbances during rearing on development and numbers of Sitophilus progeny. *Journal of Stored Products Research* 15: 37-42.

Ungsunantiwat, A., and R. B. Mills. 1985. Influence of rearing medium on size and weight of adults of four Sitophilus populations and on weight loss of host kernels (Coleoptera: Curculionidae). *Journal of Stored Products Research* 21: 89-93.

Ungsunantiwat, A., and J. R. Pedersen. 1978. Laboratory studies of flight activity of grain weevils (Sitophilus spp.) [Abstract]. *Proceedings of the North Central Branch of the Entomological Society of America* 33: 33-34.

Williams, R. N., and E. H. Floyd. 1970. Flight habits of the maize weevil, Sitophilus zeamais. *Journal of Economic Entomology* 63: 1585-1588.

Williams, R. N., and E. H. Floyd. 1971. The maize weevil in relation to sunflower. *Journal of Economic Entomology* 64: 186-187.

Yabe, T. 1985. Insects as a food source of Japanese house mice (Mus molossinus) in a seed warehouse. *Japanese Journal of Sanitary Zoology* 36: 79-81. (RAE 73: 8397)

Yoshida, T., and T. Takuma. 1959. Seasonal fluctuation of the number of the flower-visiting rice weevil, Sitophilus oryzae Linne. *Japanese Journal of Applied Entomology and Zoology* 3: 281-285. (BA 24: 59555)

CONTROL

Chemical

See Resistance to Pesticides - p. 20

Adesuyi, S. A. 1969. Post-fumigation protection of maize in aluminum silo with one per cent malathion dust. Pages 45-48 in *Nigerian Stored Products Research Institute Annual Report*. (RAE 61: 520)

Adesuyi, S. A. 1978. Comparative effectiveness of different doses of iodofenphos (Nuvanol N) in controlling insect infestation on maize in cribs. Pages 31-34 in *Nigerian Stored Products Research Institute Thirteenth Annual Report 1975-1976*. (RAE 69: 1447)

Ashman, F. 1965. Sampling methods used in an insecticide field trial in Kenya, to measure population levels of three pest species in stored maize. Pages 639-640 in *Proceedings of the XIIth International Congress of Entomology*. London. 8-16 July, 1964.

Ashman, F. 1966. An assessment of the value of dilute dust insecticides for the protection of stored maize in Kenya. *Journal of Applied Ecology* 3: 169-179.

Bitran, E. A., and T. B. Campos. 1975. Specific action of synergized pyrethroids in the control of Sitophilus zeamais Motschulsky and the possibilities of their use in stored grain protection [in Portuguese, English summary]. *Biologico* 41: 287-293.

Bitran, E. A., T. B. Campos, H. Hojo, and S. Chiba. 1984. Observations on the efficiency of cyfluthrin and of fenitrothion in tests on the

preservation of stored maize [in Portuguese, English summary]. Biologico 50: 263-269. (RAE 73: 7803)

Bitran, E. A., T. B. Campos, L. F. C. Kastrup, T. Ishizaki, and D. A. Oliveira. 1982. Evaluation of the efficiency of a malathion/dichlorvos mixture for the protection of sacked corn [in Portuguese, English summary]. Biologico 48: 239-249.

Bitran, E. A., T. B. Campos, and D. A. Oliveira. 1977. Studies on the residual persistence of bioresmethrin (synergised) and of the experimental product DOWCO-214, compared with malathion for the protection of stored maize [in Portuguese, English summary]. Anais da Sociedade Entomologica do Brasil 6: 117-124. (RAE 67: 1223)

Bitran, E. A., T. B. Campos, and D. A. Oliveira. 1979. Evaluation of the residual persistence of insecticides used to protect maize and coffee during storage. I. - Organophosphorus products [in Portuguese, English summary]. Biologico 45: 255-262. (RAE 69: 2540)

Bitran, E. A., T. B. Campos, and D. A. Oliveira. 1980. Evaluations of the residual persistence of insecticides for the protection of maize and coffee during storage. II. - Pyrethroids [in Portuguese, English summary]. Biologico 46: 45-57. (RAE 69: 4798)

Bitran, E. A., T. B. Campos, D. A. Oliveira, and J. B. M. Araujo. 1976. Experiment on the protection of corn in ear in farm storage, in view of the attack of Sitophilus zeamais Motschulsky, 1855 and Sitotroga cerealella (Olivier, 1819) [in Portuguese, English summary]. Arquivos do Instituto Biologico 43: 57-63.

Bitran, E. A., T. B. Campos, D. A. Oliveira, and J. B. M. Araujo. 1979. Experiment on the protection of maize stored in cribs by the use of malathion and pirimiphos-methyl applied alone or in conjunction with fumigation [in Portuguese, English summary]. Anais da Sociedade Entomologica do Brasil 8: 29-38. (RAE 69: 1443)

Bitran, E. A., T. B. Campos, D. A. Oliveira, and J. B. M. Araujo. 1980. Assessment of the action of the experimental product CGA-20168 (methacrifos) for the protection of maize stored in cribs [in Portuguese, English summary]. Biologico 46: 85-96. (RAE 69: 4815)

Bitran, E. A., T. B. Campos, D. A. Oliveira, and J. B. M. Araujo. 1981. Experimental evaluation of the action of the pyrethroid decamethrin in the treatment and conservation of unhusked maize in cribs [in Portuguese, English summary]. Anais da Sociedade Entomologica do Brasil 10: 105-117. (RAE 70: 6759)

Bitran, E. A., T. B. Campos, D. A. Oliveira, and J. B. M. Araujo. 1982. Protection of farm-stored maize cobs after treatments based on malathion and dichlorvos, preceded or not by fumigation [in Portuguese]. Biologico 48: 281-287. (RAE 72: 4108)

Bitran, E. A., T. B. Campos, D. A. Oliveira, and S. Chiba. 1983. Evaluation of the residual action of some organophosphorus and pyrethroid insecticides for the control of infestations of Sitophilus zeamais Motschulsky, 1855, in stored maize [in Portuguese, English summary]. Biologico 49: 265-273. (RAE 73: 3759)

Bitran, E. A., T. B. Campos, D. A. Oliveira, and S. Chiba. 1983. Evaluation of the residual effectiveness of the pyrethroid deltamethrin in stored grains [in Portuguese, English summary]. Biologico 49: 237-246. (RAE 73: 3742)

Bitran, E. A., T. B. Campos, D. A. Oliveira, and S. Chiba. 1984. Studies on the efficiency of the pyrethroid flucythrinate for the treatment and preservation of stored maize [in Portuguese, English summary]. Biologico 50: 85-92. (RAE 73: 3760)

Bitran, E. A., P. Pigati, M. T. S. Ungaro, and T. B. Campos. 1974. Tests to evaluate the residual action of bromophos in stored maize [in Portuguese, English summary]. Biologico 40: 156-159. (RAE 64: 1558)

Carino, F. O., and B. Morallo-Rejesus. 1976. Control of Sitophilus zeamais and Rhizopertha dominica by pre-harvest sprays and sack treatment

with three insecticides in three sorghum varieties. Philippine Agriculturist 60: 81-95.

Cornes, M. A., J. Donnelly, and S. A. Adeyemi. 1965. Control of field to store pests of maize ears. III. Late crop maize 1964. Pages 77-83 in Nigerian Stored Products Research Institute Annual Report 1965.

Damasco-Verbo, E., and B. Morallo-Rejesus. 1975. The residual toxicity of six insecticides to rice weevil and their effect on germination of corn. Philippine Agriculturist 59: 100-106.

Garrido, M. G., C. A. Ortega, and C. S. Moss. 1972. Evaluation of three insecticides for protection of stored grain against attack by Sitophilus zeamais Motsch. (Coleoptera, Curculionidae) and Prostephanus truncatus Horn (Coleoptera, Bostrichidae) [in Spanish]. Folia Entomologica Mexicana 23/24: 80-81. (RAE 62: 2030)

Hindmarsh, P. S., and I. A. Macdonald. 1980. Field trials to control insect pests of farm-stored maize in Zambia. Journal of Stored Products Research 16: 9-18.

Hsieh, F. K., S. L. Hsu, and L. M. Hung. 1982. Influence of posttreatment temperature on toxicities of 6 organophosphorus insecticides to two species of storage insects [in Chinese, English summary]. Plant Protection Bulletin, Taiwan 24: 37-48. (RAE 70: 7320)

Hsieh, F. K., S. L. Hsu, I. S. Wu, and G. C. Hsieh. 1983. Toxicity of commonly used insecticides to the maize weevil and lesser grain borer [in Chinese, English summary]. Plant Protection Bulletin, Taiwan 25: 285-289. (RAE 72: 7435)

Ishikura, H., and K. Ozaki. 1953. Survival and propagation of rice weevils and Angoumois grain moth on barley and wheat produced by the crops which received BHC applications during the period from heading to maturing [in Japanese, English summary]. Botyu-Kagaku 18: 93-99. (BA 18: 25937)

Kirkpatrick, R. L., L. M. Redlinger, J. L. Zettler, and R. A. Simonaitis. 1982. CGA-20168 applied to corn for control of stored-product insects. Journal of Economic Entomology 75: 277-280.

Kockum, S. 1965. Crib storage of maize. A trial with pyrethrin and lindane formulations. East African Agricultural and Forestry Journal 31: 8-10. (RAE 54: 442)

LaHue, D. W. 1976. Grain protectants for seed corn. Journal of Economic Entomology 69: 652-654.

LaHue, D. W. 1977. Chlorpyrifos-methyl: doses that protect hard winter wheat against attack by stored-grain insects. Journal of Economic Entomology 70: 734-736.

LaHue, D. W. 1978. Insecticidal dusts: grain protectants during high temperature-low humidity storage. Journal of Economic Entomology 71: 230-232.

Lemon, R. W. 1967. Laboratory evaluation of some additional organophosphorus insecticides against stored-product beetles. Journal of Stored Products Research 3: 283-287.

Lemon, R. W. 1967. The effect of fenchlorphos on Sitophilus spp. (Coleoptera, Curculionidae). Journal of Stored Products Research 3: 397-400.

Lima, C. P. F. de. 1977. An ecological study of traditional on-farm maize storage in Kenya and the effects of a control action. Pages 699-704 in Proceedings of XV International Congress of Entomology. Washington, D. C. August 19-27, 1976.

Lima, C. P. F. de. 1977. Treatment effectiveness in stored grain under conditions of non-uniform application of insecticides. Pages 120-124 in Advances in medical, veterinary and agricultural entomology in eastern Africa. Proceedings of the First E.A. Conference on Entomology and Pest Control. December 6-10, 1976. Nairobi, Kenya. (RAE 67: 1380)

Morallo-Rejesus, B. 1981. Insecticidal evaluations on stored grain insects in the Philippines. Pages 175-182 in Pests of stored products. Proceedings of BIOTROP Symposium on Pests of Stored Products. Bogor, Indonesia. 24-26 April 1978. (RAE 71: 5863)

Morallo-Rejesus, B., and F. O. Carino. 1976. The residual toxicity of five insecticides on three varieties of corn and sorghum. *Philippine Agriculturist* 60: 96-104.

Morallo-Rejesus, B., L. M. Varca, and E. H. Nerona. 1975. Insecticide impregnation of sacks and use of plastic lining for the protection of stored corn against insect damage. *Philippine Agriculturist* 59: 196-204.

Ofosu, A. 1977. Persistence of fenitrothion and pirimiphos-methyl on shelled maize. *Ghana Journal of Agricultural Science* 10: 213-216.

Parkin, E. A. 1966. The relative toxicity and persistence of insecticides applied as water-dispersible powders against stored-product beetles. *Annals of Applied Biology* 57: 1-14.

Peng, W. K. 1983. Relative toxicity of ten insecticides against six coleopterous stored-rice insect pests [in Chinese, English summary]. *National Science Council Monthly* 11: 638-644. (RAE 72: 4111)

Qureshi, A. H. 1966. An evaluation of 0,0,0'-tetramethyl-0,0'-thiodi-p-phenylene phosphorothioate against some stored products insect pests. Pages 125-128 in *Nigerian Stored Products Research Institute Annual Report* 1966.

Qureshi, A. H. 1966. Preliminary investigations on the susceptibility of some stored products insects to DDT, BHC, and fenitrothion dusts. Pages 137-140 in *Nigerian Stored Products Research Institute Annual Report* 1966.

Qureshi, A. H. 1966. Toxicity and persistence of an emulsion paint containing gamma BHC to some stored products insect pests. Pages 129-131 in *Nigerian Stored Products Research Institute Annual Report* 1966.

Singh, S. R., and J. Benazet. 1974. Chemical intervention on all stages and on all scales of tropical storage practice. Pages 41-46 in *Proceedings of the First International Working Conference on Stored-Product Entomology*. Savannah, Georgia, USA. October 7-11, 1974.

Strong, R. G., D. E. Sbur, and G. J. Partida. 1967. The toxicity and residual effectiveness of malathion and diazinon used for protection of stored wheat. *Journal of Economic Entomology* 60: 500-505.

Sun, F., S. C. Wang, and T. Y. Ku. 1984. Effects of degradation in toxicity of insecticides on the survival and reproductive rate of maize weevils [in Chinese, English summary]. *Plant Protection Bulletin, Taiwan* 26: 55-62. (RAE 72: 8154)

Viljoen, J. H., J. J. Coetzer, P. R. de Beer, S. Prinsloo, A. J. Basson, and C. Vermaak. 1981. The toxicity of contact insecticides to seed-infesting insects. Series No. 6. Pirimiphos-methyl as a grain protectant. *Technical Communication, Department of Agriculture and Fisheries, South Africa*. No. 173. 11 pp. (RAE 70: 1766)

Weaving, A. J. S. 1975. Grain protectants for use under tribal storage conditions in Rhodesia -1. Comparative toxicities of some insecticides on maize and sorghum. *Journal of Stored Products Research* 11: 65-70.

Weaving, A. J. S. 1980. Grain protectants for use under tribal storage conditions in Zimbabwe (Rhodesia) -2. Duration of protection in small-scale laboratory trials. *Zimbabwe Journal of Agricultural Research* 18: 111-121.

Weaving, A. J. S. 1981. Grain protectants for use under tribal storage conditions in Zimbabwe (Rhodesia) -3. Evaluation of admixtures with maize stored in traditional grain bins. *Zimbabwe Journal of Agricultural Research* 19: 205-224.

Webley, D. J., and K. M. Kilminster. 1980. The persistence of insecticide spray deposits on woven polypropylene and jute sacking. *Pesticide Science* 11: 667-673.

Wolfenbarger, D. A., and C. E. Holscher. 1967. Contact and fumigant toxicity of oils, surfactants, and insecticides to two aphid and three beetle species. *Florida Entomologist* 50: 27-36.

Fumigation

See Resistance to Pesticides - p. 20

Adesuyi, S. A. 1969. An assessment of the efficacy of phostoxin for the control of grain pests in silos. Part III. Pages 39-44 in Nigerian Stored Products Research Institute Annual Report. (RAE 61: 519)

Adesuyi, S. A., and M. A. Cornes. 1966. An assessment of the efficacy of phostoxin for the control of grain pests in silos. Part II. Pages 109-111 in Nigerian Stored Products Research Institute Annual Report 1966.

Bitran, E. A. 1979. The importance of fumigation in tests on the preservation of stored maize in cribs [in Portuguese, English summary]. Revista Brasileira de Armazenamento 4: 15-16. (RAE 68: 4121)

Bitran, E. A., and T. B. Campos. 1975. Fumigation of stored maize in concrete silos [in Portuguese, English summary]. Anais da Sociedade Entomologica do Brasil 4: 85-91.

Bitran, E. A., T. B. Campos, D. A. Oliveira, and J. B. M. Araujo. 1976. Experiments on the protection of corn in ear in farm storage, in view of the attack of Sitophilus zeamais Motschulsky, 1855 and Sitotroga cerealella (Olivier, 1819) [in Portuguese, English summary]. Arquivos do Instituto Biológico 43: 57-63.

Bitran, E. A., T. B. Campos, D. A. Oliveira, and J. B. M. Araujo. 1979. Experiment on the protection of maize stored in cribs by the use of malathion and pirimiphos-methyl applied alone or in conjunction with fumigation [in Portuguese, English summary]. Anais da Sociedade Entomologica do Brasil 8: 29-38. (RAE 69: 1443)

Bitran, E. A., T. B. Campos, D. A. Oliveira, and J. B. M. Araujo. 1980. Assessment of the action of the experimental product CGA-20168 (methacrifos) for the protection of maize stored in cribs [in Portuguese, English summary]. Biológico 46: 85-96. (RAE 69: 4815)

Bitran, E. A., T. B. Campos, D. A.

Oliveira, and J. B. M. Araujo. 1981. Experimental evaluation of the action of the pyrethroid decamethrin in the treatment and conservation of unhusked maize in cribs [in Portuguese, English summary]. Anais da Sociedade Entomológica do Brasil 10: 105-117. (RAE 70: 6759)

Bitran, E. A., T. B. Campos, D. A. Oliveira, and J. B. M. Araujo. 1982. Protection of farm-stored maize cobs after treatments based on malathion and dichlorvos, preceded or not by fumigation [in Portuguese]. Biológico 48: 281-287. (RAE 72: 4108)

Bitran, E. A., S. Lazzarini, and P. P. de Mendonca. 1971. The action of phosphine on the maize weevil in warehouses and silos [in Portuguese, English summary]. Biológico 37: 195-198. (RAE 61: 488)

Bitran, E. A., P. Pigati, T. B. Campos, and M. T. S. Ungaro. 1973. The action of 'smokes' on some pests of stored grains [in Portuguese, English summary]. Biológico 39: 240-244. (RAE 63: 3734)

Cornes, M. A., and S. A. O. Adeyemi. 1968. Phosphine fumigation of maize in an open top steel bin. Nigerian Entomologists' Magazine 1: 108-114. (RAE 59: 1410)

Cornes, M. A., S. A. O. Adeyemi, and A. H. Qureshi. 1967. An assessment of the value of phosphine and ethylene dibromide for the control of pests in grain stored in polythene lined sacks. Pages 113-121 in Nigerian Stored Products Research Institute Annual Report.

Cornes, M. A., and J. O. Oyeniran. 1968. Fumigation of maize in an aluminum silo using a 1:1 carbon tetrachloride: ethylene dichloride mixture. Pages 109-111 in Nigerian Stored Products Research Institute Annual Report. (RAE 59: 1075)

Gillenwater, H. B., L. M. Redlinger, J. L. Zettler, R. Davis, L. L. McDonald, and J. M. Zehner. 1981. Phosphine fumigation of corn in-transit on a bulk-dry cargo ship. Journal of the Georgia Entomological Society 16: 462-475.

Hole, B. D., C. H. Bell, K. A. Mills, and G. Goodship. 1976. The toxicity

of phosphine to all developmental stages of thirteen species of stored product beetles. *Journal of Stored Products Research* 12: 235-244.

Howe, R. W. 1962. The entomological problems of assessing the success of a fumigation of stored produce. Pages 288-290 in *Proceedings of the Eleventh International Congress of Entomology*. Vienna, Austria. 1960. Volume 2.

Leesch, J. G., L. M. Redlinger, H. B. Gillenwater, R. Davis, and J. M. Zehner. 1978. An in-transit shipboard fumigation of corn. *Journal of Economic Entomology* 71: 928-935.

Lima, C. P. F. de. 1984. Minimal fumigant requirements for long-term air-tight storage of grain. Pages 665-671 in B. E. Ripp, ed. *Controlled atmosphere and fumigation in grain storages*. *Proceedings of an international symposium "Practical aspects of controlled atmosphere and fumigation in grain storages"* held from 11 to 22 April 1983 in Perth, Western Australia. Amsterdam: Elsevier.

Lin, T., and L. M. Horng. 1977. Studies on the effectiveness of the fumigants Celphos and Phostoxin against granary insects and their effects on the germination of seeds [in Chinese, English summary]. *Journal of Agricultural Research of China* 26: 72-80. (RAE 66: 918)

Nakakita, H. 1976. Mitochondria of maize weevils, *Sitophilus zeamais* (M.). II. Components of cytochromes and effects of phosphine on adult maize weevil mitochondria. *Applied Entomology and Zoology* 11: 327-334.

Nakakita, H., T. Saito, and K. Iyatomi. 1974. Effect of phosphine on the respiration of adult *Sitophilus zeamais* Motsch. (Coleoptera, Curculionidae). *Journal of Stored Products Research* 10: 87-92.

Ni, Z. Z. 1984. Fumigation trials with carbon disulphide:carbon tetrachloride (20:80) in silo bins. Pages 657-662 in B. E. Ripp, ed. *Controlled atmosphere and fumigation in grain storages*. *Proceedings of an international symposium "Practical aspects of controlled atmosphere and fumigation in grain storages"* held from 11 to 22 April 1983 in Perth, Western Australia. Amsterdam: Elsevier.

aspects of controlled atmosphere and fumigation in grain storages" held from 11 to 22 April 1983 in Perth, Western Australia. Amsterdam: Elsevier.

Proctor, D. L., and F. Ashman. 1972. The control of insects in exported Zambian groundnuts using phosphine and polyethylene lined sacks. *Journal of Stored Products Research* 8: 127-137.

Qureshi, A. H. 1966. The toxicity of hydrogen phosphide to some insect pests of stored products fumigated in 44-gallon drums containing cocoa. Pages 133-136 in *Nigerian Stored Products Research Institute Annual Report* 1966.

Saito, T. 1950. On the influence of nutritional condition of insect upon the resistability to fumigants [in Japanese, English summary]. *Botyu-Kagaku* 15: 53-61. (BA 14: 69638)

Sato, K., and M. Suwanai. 1973. Studies on the characteristics of action of fumigants. II. Entrance of hydrogen phosphide into weevil body under conditions of the failure to respire for the weevil [in Japanese, English summary]. *Botyu-Kagaku* 38: 213-216.

Taylor, R. W. D. 1975. Fumigation of individual sacks of grain using methallyl chloride for control of maize weevil. *International Pest Control* 17(1): 4-8.

Viljoen, J. H., J. J. Coetzer, and C. J. Vermaak. 1981. Fumigation trials with a mixture of methyl bromide and carbon dioxide in larger type silo bins. *Phytophylactica* 13: 127-137.

Viljoen, J. H., J. J. Coetzer, and C. J. Vermaak. 1984. Fumigation trials with a mixture of methyl bromide and carbon dioxide in larger type silo bins. Pages 395-417 in B. E. Ripp, ed. *Controlled atmosphere and fumigation in grain storages*. *Proceedings of an international symposium "Practical aspects of controlled atmosphere and fumigation in grain storages"* held from 11 to 22 April 1983 in Perth, Western Australia. Amsterdam: Elsevier.

Webley, D. J., and A. H. Harris. 1977. A comparison of fumigants for in-bag fumigation. *Tropical Stored*

Products Information 33: 9-17.

Zettler, J. L., H. B. Gillenwater, L. M. Redlinger, J. G. Leesch, R. Davis, L. L. McDonald, and J. M. Zehner. 1982. In-transit shipboard fumigation of corn on a tanker vessel. Journal of Economic Entomology 75: 804-808.

Zettler, J. L., H. B. Gillenwater, L. M. Redlinger, J. G. Leesch, R. Davis, L. L. McDonald, and J. M. Zehner. 1984. Efficacy of perforated tubing in assisting phosphine distribution for in-transit fumigation of export corn. Journal of Economic Entomology 77: 675-679.

Growth Regulators

Bransby-Williams, W. R. 1972. Activity of two juvenile hormone analogues with Heliothis armigera (Hubner), Sitophilus zeamais Motschulsky and Ephestia cautella (Walker). East African Agricultural and Forestry Journal 38: 170-174. (RAE 62: 2043)

Edwards, J. P., and J. E. Short. 1984. Evaluation of three compounds with insect juvenile hormone activity as grain protectants against insecticide-susceptible and resistant strains of Sitophilus species (Coleoptera: Curculionidae). Journal of Stored Products Research 20: 11-15.

Kramer, K. J., R. W. Beeman, and L. H. Hendricks. 1981. Activity of R013-5223 and R013-7744 against stored-product insects. Journal of Economic Entomology 74: 678-680.

McGregor, H. E., and K. J. Kramer. 1976. Activity of Dimilin(R) (TH6040) against Coleoptera in stored wheat and corn. Journal of Economic Entomology 69: 479-480.

Host Plant Resistance

Adesuyi, S. A. 1979. Relative resistance of some varieties of maize to attack by Sitophilus zeamais (Mots.). Pages 79-82 in Nigerian Stored Products Research Institute Annual Report 1976-77. (RAE 68: 6648)

Bernabe-Adalla, C., and E. N. Bernardo. 1976. Correlation between husk characters and weevil infestation of 51 varieties and lines of maize in the field. Philippine Agriculturist 60: 121-129.

Bernabe-Adalla, C., and E. N. Bernardo. 1976. Mechanism of resistance of ten maize varieties to the rice weevil complex. Philippine Agriculturist 60: 112-120.

Betanzos Mendoza, E. 1980. Selection of high-quality protein varieties of maize for resistance to the maize weevil Sitophilus zeamais (Motsch.). 1. Correlations between grain characteristics and resistance indicators [in Spanish, English summary]. Agricultura Tecnica en Mexico 6: 45-66. (RAE 70: 1421)

Bhatia, S. K. 1978. Wheat grain variability to infestation by storage pests. Journal of Entomological Research 2: 106-111.

Bishara, S. I. 1965. The oviposition preference of the granary and the rice weevils on some wheat varieties in U.A.R. Agricultural Research Review 43: 47-54. (BA 31: 37898)

Caetano, W., C. R. Schweder, and R. Barth. 1982. Performance of four hybrids of maize to the attack of storage grain insects in spikes due to delayed harvest [in Portuguese, English summary]. Agronomia Sulriograndense 18: 25-31.

Davis, F. M., G. E. Scott, and W. J. Drapala. 1975. Techniques for evaluating corn genotypes under maize weevil attack. United States Department of Agriculture ARS S-75. 6 pp.

Diaz Castro, G. 1972. Importance of the husk and of the Opaco 2 gene of maize in the study of insects of stored grains [in Spanish, English summary]. Agricultura Tecnica en Mexico 3: 153-156. (RAE 63: 2754)

Dobie, P. 1974. The laboratory assessment of the inherent susceptibility of maize varieties to post-harvest infestation by Sitophilus zeamais Motsch. (Coleoptera, Curculionidae). Journal of Stored Products Research 10: 183-197.

Dobie, P. 1974. The susceptibility of different types of maize to post-harvest infestation by Sitophilus zeamais and Sitotroga cerealella, and

the importance of this factor at the small-scale farm level. Pages 98-113 in Proceedings of the First International Working Conference on Stored-Product Entomology. Savannah, Georgia, USA. October 7-11, 1974.

Dobie, P. 1977. Insect resistance in stored maize. *World Crops and Livestock* 29: 200-201.

Dobie, P. 1977. The contribution of the Tropical Stored Products Centre to the study of insect resistance in stored maize. *Tropical Stored Products Information* 34: 7-22. (RAE 66: 3667)

Dobie, P., and A. M. Kilminster. 1978. The susceptibility of triticale to post-harvest infestation by Sitophilus zeamais Motschulsky, Sitophilus oryzae (L.) and Sitophilus granarius (L.). *Journal of Stored Products Research* 14: 87-93.

Fortier, G., J. T. Arnason, J. D. H. Lambert, J. McNeill, C. Nozzolillo, and B. J. R. Philogene. 1982. Local and improved corns (Zea mays) in small farm agriculture in Belize, C.A.; their taxonomy, productivity, and resistance to Sitophilus zeamais. *Phytoprotection* 63: 68-78. (RAE 71: 4418)

Gebrekidan, B. 1985. Breeding sorghum for resistance to insects in eastern Africa. *Insect Science and Its Application* 6: 351-357. (RAE 73: 8178)

Ivbijaro, M. F. 1981. The resistance of new varieties of maize to post-harvest infestation by Sitophilus zeamais Motsch and Sitophilus oryzae (L.). *Journal of Agricultural Science* 96: 479-481.

Lima, J. O. G. de, G. Diaz Castro, and C. S. Moss. 1972. The effect of grain size and of maize samples of different provenance on attractiveness to, and development of, Sitotroga cerealella (Olivier) and Sitophilus zeamais Motschulsky [in Spanish]. *Folia Entomologica Mexicana* 23/24: 69-70. (RAE 62: 2415)

Link, D., and V. Estefanel. 1971. Differences between varieties of maize with respect to natural infestation by Sitophilus zeamais Mots. and Sitotroga cerealella (Oliv.) [in Portuguese, English summary]. *Agronomia Sulriograndense* 5: 157-161. (RAE 60: 4957)

Mills, R. B. 1973. Development of Sitophilus zeamais Motsch. in WURLD wheat. *Journal of Stored Products Research* 8: 271-274.

Morales, A. C. 1975. Nutritive value and susceptibility of opaque-2 composite K and different types of corn to the larger rice weevil Sitophilus zeamais Mots. *Philippine Agriculturist* 58: 280-286.

Morallo-Rejesus, B., P. A. Javier, and B. O. Juliano. 1981. Properties of brown rice and varietal resistance to storage insects. *Philippine Entomologist* 5: 227-238. (RAE 71: 5868)

Nwana, I. E., and D. T. Akibo-Betts. 1982. The resistance of some rice varieties to damage by Sitophilus zeamais Motschulsky during storage. *Tropical Stored Products Information* 43: 10-15. (RAE 70: 6221)

Nwankwo, F. I., and E. O. Nwogu. 1979. A survey of the quality of yellow and white maize sold in Port Harcourt market. Pages 83-85 in *Nigerian Stored Products Research Institute Annual Report 1976-77*. (RAE 68: 6649)

Ofosu, A. 1977. A further note on the infestation potential of the grains of some Ghanaian maize varieties to Sitophilus zeamais Motsch. (Coleoptera, Curculionidae). *Ghana Journal of Agricultural Science* 10: 147-148. (RAE 69: 4807)

Peng, W. K., and W. T. Hsia. 1984. Hardness of rice kernel and its relevance to the resistance to maize weevil [in Chinese, English summary]. *Plant Protection Bulletin, Taiwan* 26: 231-240. (RAE 73: 1066)

Ramalho, F. S. 1976. Resistance of races, hybrids and varieties of corn in the shuck and as grain to Sitophilus zeamais Motschulsky, 1855. *Boletin Divulgacion Escola Superior de Agricultura 'Luiz de Queiroz'* 22: 40-42.

Rego, A. F. de M., A. F. de S. L. Veiga, M. L. Pimentel, Z. A. Rodrigues, and M. L. de Oliveira. 1984. Response of cultivars of

Sorghum bicolor (L.) Moench to attack by Sitophilus zeamais Motschulsky 1855 (Coleoptera, Curculionidae) [in Portuguese, English summary]. Ciencia e Cultura 36: 988-992. (RAE 73: 6514)

Rego, A. F. de M., A. F. de S. L. Veiga, Z. A. Rodrigues, M. L. de Oliveira, and M. L. Pimentel. 1984. Response of promising cultivars of maize and sorghum to normal and irradiated Sitophilus zeamais (Coleoptera, Curculionidae) Motschulsky 1855, under laboratory conditions [in Portuguese, English summary]. Ciencia e Cultura 36: 2173-2180. (RAE 73: 5214)

Rezende, J. A. M., J. R. Zinsly, C. J. Rossetto, and V. Nagai. 1978. A possible source of resistance to the maize weevil (Sitophilus zeamais Motschulsky, 1855) in corn in the husk [in Portuguese, English summary]. Bragantia 37: 17-24.

Robinson, R. R., and R. B. Mills. 1971. Susceptibility of the gelatinized wheat product bulgur to Sitophilus zeamais Motsch. and Rhyzopertha dominica (F.). Journal of Stored Products Research 6: 317-323.

Rogers, R. R., and R. B. Mills. 1974. Evaluation of a world sorghum collection for resistance to the maize weevil, Sitophilus zeamais Motsch., (Coleoptera: Curculionidae). Journal of the Kansas Entomological Society 47: 36-41.

Rogers, R. R., and R. B. Mills. 1974. Reactions of sorghum varieties to maize weevil infestation under three relative humidities. Journal of Economic Entomology 67: 692.

Rossetto, C. J., H. Painter, and D. A. Wilbur. 1971. Resistance of varieties of rice to Sitophilus zeamais Motschulsky (Coleoptera, Curculionidae). Pages 381-382 in Proceedings of the XIIIth International Congress of Entomology. Moscow. 2-9 August, 1968. Volume 2. (RAE 60: 4373)

Russell, M. P. 1968. Influence of rice variety on oviposition and development of the rice weevil, Sitophilus oryzae, and the maize weevil, S. zeamais. Annals of the Entomological Society of America 61: 1335-1336.

Russell, M. P., and M. M. Rink. 1965. Some effects of sorghum varieties on the development of a rice weevil, Sitophilus zeamais (Coleoptera: Curculionidae). Annals of the Entomological Society of America 58: 763.

Santos, J. P., and J. E. Foster. 1981. Identification of maize kernels resistant to the maize weevils [in Portuguese, English summary]. Pesquisa Agropecuaria Brasileira 16: 39-43.

Santos, J. P., and J. E. Foster. 1981. Preference and reproductivity of the maize weevil as resistance factors with some populations and inbreds of maize [in Portuguese, English summary]. Pesquisa Agropecuaria Brasileira 16: 769-775. (RAE 70: 6217)

Schoonhoven, A. V., E. Horber, and R. B. Mills. 1976. Conditions modifying expression of resistance of maize kernels to the maize weevil. Environmental Entomology 5: 163-168.

Schoonhoven, A. V., E. Horber, R. B. Mills, and C. E. Wassom. 1972. Resistance in corn kernels to the maize weevil, Sitophilus zeamais Motsch. Proceedings of the North Central Branch of the Entomological Society of America 27: 108-110.

Schoonhoven, A. V., R. B. Mills, and E. Horber. 1974. Development of Sitophilus zeamais Motschulsky, in maize kernels and pellets made from maize kernel fractions. Journal of Stored Products Research 10: 73-80.

Schoonhoven, A. V., C. E. Wassom, and E. Horber. 1972. Development of maize weevil on kernels of opaque-2 and floury-2, nearly isogenic corn inbred lines. Crop Science 12: 862-863.

Sinha, R. N. 1971. Multiplication of some stored-product insects on varieties of wheat, oats, and barley. Journal of Economic Entomology 64: 98-102.

Turner, J. W. 1976. Resistance of maize to field infestation by Sitophilus zeamais Motschulsky and Sitotroga

cerealella (Olivier). Queensland Journal of Agricultural and Animal Sciences 33: 155-159.

VanDerSchaaf, P., D. A. Wilbur, and R. H. Painter. 1969. Resistance of corn to laboratory infestation of the larger rice weevil, Sitophilus zeamais. Journal of Economic Entomology 62: 352-355.

Villacis, S. J., M. C. Sosa, and C. A. Ortega. 1972. Behaviour of Sitotroga cerealella Olivier (Lepid.: Gelechiidae) and Sitophilus zeamais Motschulsky (Coleop.: Curculionidae) in ten types of maize with contrasting characteristics [in Spanish, English summary]. Revista Peruana de Entomologia 15: 153-164. (RAE 64: 682)

Villacis, S. J., M. C. Sosa, and C. A. Ortega. 1972. The nutritional and reproductive effects of five types of maize on the development of Sitophilus zeamais Motschulsky (Coleoptera: Curculionidae) [in Spanish, English summary]. Revista Peruana de Entomologia 15: 147-152. (RAE 64: 681)

Wheatley, P. E. 1973. Relative susceptibility of maize varieties. Tropical Stored Products Information 25: 16-18.

Widstrom, N. W., W. D. Hanson, and L. M. Redlinger. 1975. Inheritance of maize weevil resistance in maize. Crop Science 15: 467-470.

Widstrom, N. W., W. W. McMillian, L. M. Redlinger, and W. J. Wiser. 1983. Dent corn inbred sources of resistance to the maize weevil (Coleoptera: Curculionidae). Journal of Economic Entomology 76: 31-33.

Widstrom, N. W., W. W. McMillian, and B. R. Wiseman. 1978. Improving effectiveness of measurements for seed resistance to maize weevil. Journal of Economic Entomology 71: 901-903.

Widstrom, N. W., W. W. McMillian, and B. R. Wiseman. 1980. The effect of waxy endosperm corn on resistance to the maize weevil. Florida Entomologist 63: 514-515.

Widstrom, N. W., W. W. McMillian, and B. R. Wiseman. 1981. The influence of timely harvest on maize weevil feeding and fecundity on corn. Journal of the Georgia Entomological Society 16: 234-239.

Widstrom, N. W., L. M. Redlinger, and W. J. Wiser. 1972. Appraisal of methods for measuring corn kernel resistance to Sitophilus zeamais. Journal of Economic Entomology 65: 790-792.

Wiseman, B. R., W. W. McMillian, and N. W. Widstrom. 1970. Husk and kernel resistance among maize hybrids to an insect complex. Journal of Economic Entomology 63: 1260-1262.

Miscellaneous

Bailey, S. W. 1957. Air-tight storage of grain; its effects on insect pests. III. Calandra oryzae (large strain). Australian Journal of Agricultural Research 8: 595-603.

Dunkel, F., P. Z. Lung, L. Chuan, and H. F. Yin. 1982. Insect and fungal response to sorbic acid-treated wheat during storage in South China. Journal of Economic Entomology 75: 1083-1088.

Hutchinson, M. T. 1972. Control of Sitophilus zea-mays in stored maize by using a modified mud-block dryer. Nigerian Entomologists' Magazine 2: 56-58. (RAE 61: 1737)

Jay, E. 1984. Imperfections in our current knowledge of insect biology as related to their response to controlled atmospheres. Pages 493-508 in B. E. Ripp, ed. Controlled atmosphere and fumigation in grain storages. Proceedings of an international symposium "Practical aspects of controlled atmosphere and fumigation in grain storages" held from 11 to 22 April 1983 in Perth, Western Australia. Amsterdam: Elsevier.

Jiang, X. L. 1981. A preliminary experimental report on killing pests by laser [in Chinese]. Liangshizhuzang 4: 33-36. (RAE 70: 5635)

Lima, C. P. F. de. 1980. Field experience with hermetic storage of grain in Eastern Africa with emphasis on structures intended for famine reserves. Pages 39-53 in J. Shejbal, ed. Controlled atmosphere storage of grains. An international symposium

held from 12 to 15 May 1980 at Castelgandolfo (Rome) Italy. Amsterdam: Elsevier.

Ohguchi, Y., H. Suzuki, S. Tatsuki, and J. I. Fukami. 1983. Lethal effect of oxygen absorber (Ageless^(R)) on several stored grain and clothes pest insects [in Japanese, English summary]. Japanese Journal of Applied Entomology and Zoology 27: 270-275. (RAE 72: 4911)

Ramos-Elorduy de Conconi, J. 1983. Laser light as a new potential method for pest control in preserved foods. Pages 592-608 in T. A. Oxley and S. Barry, eds. Biodeterioration 5. Papers presented at the 5th International Biodeterioration Symposium. Aberdeen. September, 1981. John Wiley and Sons, Chichester, U.K. (RAE 73: 5206)

Spratt, E. C. 1979. Some effects of a mixture of oxygen, carbon dioxide and nitrogen in the ratio 1:1:8 on the oviposition and development of Sitophilus zeamais Mots. (Coleoptera, Curculionidae). Journal of Stored Products Research 15: 73-80.

Spratt, E. C. 1979. The effects of a mixture of oxygen, carbon dioxide and nitrogen in the ratio 1:1:8 on the longevity and the rate of increase of populations of Sitophilus zeamais Mots. Journal of Stored Products Research 15: 81-85.

Tilton, E. W., and H. H. Vardell. 1982. Combination of microwaves and partial vacuum for control of four stored-product insects in stored grain. Journal of the Georgia Entomological Society 17: 106-112.

Williams, J. O., S. A. Adesuyi, and J. Shejbal. 1980. Susceptibility of the life stages of Sitophilus zeamais and Trogoderma granarium larvae to nitrogen atmosphere in minisilos. Pages 93-100 in J. Shejbal, ed. Controlled atmosphere storage of grains. An international symposium held from 12 to 15 May 1980 at Castelgandolfo (Rome) Italy. Amsterdam: Elsevier.

Yasue, Y. 1954. Studies on the insecticidal properties of certain antibiotics. I. Toxic effect of aureomycin upon the rice weevil, Calandra oryzae and the small rice weevil, Calandra sasakii [in Japanese]. Nogaku Kenkyu 42: 114-117. (BA 19: 71949)

Yoshida, T. 1974. Effect of sun-drying on the mortality of immature rice weevils, Sitophilus zeamais Motsch. (Coleoptera, Curculionidae) [in Japanese, English summary]. Scientific Reports of the Faculty of Agriculture Okayama University 43: 11-17.

Natural Enemies

Champ, B. R. 1966. Insects and mites associated with stored products in Queensland. 3. Hymenoptera. Queensland Journal of Agricultural and Animal Sciences 23: 177-195.

Chesnut, T. L., and W. A. Douglas. 1971. Competitive displacement between natural populations of the maize weevil and the Angoumois grain moth in Mississippi. Journal of Economic Entomology 64: 864-868.

Sharifi, S. 1972. Radiographic studies of the parasite Choetopsila elegans on the maize weevil, Sitophilus zeamais. Annals of the Entomological Society of America 65: 852-856.

Williams, R. N., and E. H. Floyd. 1971. Effect of low temperatures on hymenopterous parasites Choetopsila elegans and Anisopteromalus calandrae of the maize weevil. Journal of Economic Entomology 64: 1438-1439.

Williams, R. N., and E. H. Floyd. 1971. Effect of two parasites, Anisopteromalus calandrae and Choetopsila elegans, upon populations of the maize weevil under laboratory and natural conditions. Journal of Economic Entomology 64: 1407-1408.

Natural Products

Golob, P., J. Mwambula, V. Mhango, and F. Ngulube. 1982. The use of locally available materials as protectants of maize grain against insect infestation during storage in Malawi. Journal of Stored Products Research 18: 67-74.

Hsieh, F. K., S. S. Kao, and W. G. Chen. 1978. Tests on control of the maize weevil, Sitophilus zeamais Motschulsky by nontoxic materials [in Chinese, English summary]. Plant Protection Bulletin, Taiwan 20: 8-15.

Ivbijaro, M. F. 1984. Groundnut oil as a protectant of maize from damage by the grain weevil, Sitophilus zeamais Motsch. Protection Ecology 6: 267-270. (RAE 72: 5619)

Jin, L. Z., and X. F. Pan. 1983. A new measure on the control of grain storage insects by marsh gas [in Chinese]. Insect Knowledge (Kunchong Zhishi) 20: 118-119. (RAE 72: 8156)

Pereira, J., and R. Wohlgemuth. 1982. Neem (Azadirachta indica A. Juss) of West African origin as a protectant of stored maize. Zeitschrift für Angewandte Entomologie 94: 208-214. (RAE 70: 7277)

Soeda, Y., and I. Yamamoto. 1969. Studies on nicotinoids as an insecticide. Part VIII. Physiological activities of the optical isomers of nicotinoids. Botyu-Kagaku 34: 57-62.

Zhang, X., and S. H. Zhao. 1983. Experiments on some substances from plants for the control of rice weevils [in Chinese]. Journal of Grain Storage (Liangshi Chucang) 1: 1-8. (RAE 72: 1212)

Packaging

Monte, G. dal. 1974. New tests on the resistance of some packaging materials to attack by grain-feeding insects [in Italian, English summary]. Rome, Italy; Ministero dell'Agricoltura e delle Foreste. 47 pp. (RAE 64: 3261)

Qureshi, A. H. 1968. An assessment of woven polythene bags for handling produce under Northern Nigerian conditions. Pages 153-156 in Nigerian Stored Products Research Institute Annual Report 1967. (RAE 59: 1079)

Yerington, A. P. 1979. Methods to increase the insect resistance of food shipping cases. United States Department of Agriculture, Science and Education Administration,

Advances in Agricultural Technology, AAT-W-7. 5 pp.

Radiation

Brown, G. A., J. H. Brower, and E. W. Tilton. 1972. Gamma radiation effects on Sitophilus zeamais and S. granarius. Journal of Economic Entomology 65: 203-205.

Camargo, A. A., M. A. Bergamo, and F. M. Wiendl. 1983. Effects of temperature variations before and after gamma-radiation on the life-span and reproduction of Sitophilus zeamais Motschulsky, 1855 (Coleoptera, Curculionidae) [in Portuguese, English summary]. Revista de Agricultura (Piracicaba, Brazil) 58: 49-63. (RAE 72: 137)

Cornwell, P. B. 1966. Susceptibility of the grain and rice weevils, Sitophilus granarius (L.) and Sitophilus zeamais Mots. to gamma radiation. Pages 1-18 in P. B. Cornwell, ed. The entomology of radiation disinfestation of grain. A collection of original research papers. Pergamon Press, New York.

Kumagai, M. 1967. Influence of post-treatment humidity on the irradiated rice weevil adult, Sitophilus zeamais Motschulsky (Coleoptera: Curculionidae). Applied Entomology and Zoology 2: 51-57. (RAE 55: 2504)

Pesson, P., and G. K. Girish. 1968. Sensitivity of various development stages of Sitophilus zeamais Mots (S. oryzae L.) to ionizing radiations. Study of immature stages by radiography and actographic recording [in French, English summary]. Pages 123-137 in Isotopes and radiation in entomology. Proceedings of a symposium on the use of isotopes and radiation in entomology jointly organized by the IAEA and the FAO of the United Nations and held in Vienna, 4-8 December 1967.

Pesson, P., and G. K. Girish. 1968. Sensitivity of various developmental stages of Sitophilus zeamais Mots (= S. oryzae L.) to ionizing radiations. Study of immature stages by radiography and actographic recording [in French,

English summary]. *Annales des Epiphyties* 19: 513-531.

Shipp, E. 1966. Susceptibility of Australian strains of Sitophilus and Tribolium species to gamma radiation. Pages 131-141 in P. B. Cornwell, ed. *The entomology of radiation disinfestation of grain. A collection of original research papers.* Pergamon Press, New York.

Watters, F. L. 1968. An appraisal of gamma irradiation for insect control in cereal foods. *Manitoba Entomologist* 2: 37-45.

Watters, F. L. 1979. Potential of accelerated electrons for insect control in stored grain. Pages 278-286 in *Proceedings of the Second International Working Conference on Stored-Product Entomology.* Ibadan, Nigeria. September 10-16, 1978.

Wiendl, F. M., J. M. Pacheco, J. M. M. Walder, R. B. Sgrillo, and R. E. Domarco. 1975. A method of determining the gamma radiation doses for the sterilization of stored product insects. Pages 289-315 in *Sterility principle for insect control 1974. Proceedings of the symposium on the sterility principle for insect control jointly organized by the International Atomic Energy Agency and the Food and Agriculture Organization of the United Nations, and held in Innsbruck, 22-26 July, 1974.*

Resistance to Pesticides

Brun, L. O., and F. I. Attia. 1983. Resistance to lindane, malathion and fenitrothion in coleopterous pests of stored products in New Caledonia. *Proceedings of the Hawaiian Entomological Society* 24: 211-215.

Champ, B. R., and J. N. Cribb. 1965. Lindane resistance in Sitophilus oryzae (L.) and Sitophilus zeamais Motsch. (Coleoptera, Curculionidae) in Queensland. *Journal of Stored Products Research* 1: 9-24.

Champ, B. R., and C. E. Dyte. 1976. Report of the FAO global survey of pesticide susceptibility of stored grain pests. *Food and Agriculture Organization Plant Production and Protection Series No. 5.* 297 pp.

Champ, B. R., and C. E. Dyte. 1977. FAO global survey of pesticide susceptibility of stored grain pests. *FAO Plant Protection Bulletin* 25: 49-67.

Dyte, C. E. 1974. Problems arising from insecticide resistance in storage pests. *Bulletin Organisation Europeenne et Mediterraneenne pour la Protection des Plantes* 4: 275-289.

Dyte, C. E., A. A. Green, and D. B. Pinniger. 1974. Some consequences of the development of insecticide resistance in stored-product insects. Pages 261-271 in *Proceedings of the First International Working Conference on Stored-Product Entomology.* Savannah, Georgia, USA. October 7-11, 1974.

Dyte, C. E., K. A. Mills, and N. R. Price. 1983. Recent work on fumigant-resistant insect strains. In P. L. G. Bateman, ed. *Proceedings of the Sixth British Pest Control Conference.* Robinson College, Cambridge. September 7-10, 1983. 12 pp. (RAE 73: 2749)

Evans, N. J. 1985. The effectiveness of various insecticides on some resistant beetle pests of stored products from Uganda. *Journal of Stored Products Research* 21: 105-109.

Food and Agriculture Organization Working Party of Experts on Pest Resistance to Pesticides. 1975. Recommended methods for the detection and measurement of resistance of agricultural pests to pesticides. Tentative method for adults of some major pest species of stored cereals, with methyl bromide and phosphine - FAO method no. 16. *FAO Plant Protection Bulletin* 23: 12-25.

Food and Agriculture Organization Working Party of Experts on the Resistance of Pests to Pesticides. 1974. Recommended methods for the detection and measurement of resistance of agricultural pests to pesticides. Tentative method for adults of some major beetle pests of stored cereals with malathion or lindane - FAO method no. 15. *FAO Plant Protection Bulletin* 22: 127-137.

Hole, B. D. 1981. Variation in tolerance of seven species of stored product Coleoptera to methyl bromide and phosphine in strains from twenty-nine countries. *Bulletin of Entomological Research* 71: 299-306.

Horton, P. M. 1984. Evaluation of South Carolina field strains of certain stored-product Coleoptera for malathion resistance and pirimiphos-methyl susceptibility. *Journal of Agricultural Entomology* 1: 1-5.

Lima, C. P. F. de. 1972. Lindane resistance in field strains of *Sitophilus zeamais* (Motsch.) in Kenya. *Journal of Stored Products Research* 8: 167-175.

Parkin, E. A. 1965. The onset of insecticide resistance among field populations of stored-product insects. *Journal of Stored Products Research* 1: 3-8.

Parkin, E. A., and R. Forster. 1963. Increased resistance of stored-product insects to insecticides. The rice weevil and lindane. *Pest Infestation Research* 1962: 37-38.

Parkin, E. A., and R. Forster. 1964. Increased resistance of stored-product insects to insecticides. The rice weevil and lindane. *Pest Infestation Research* 1963: 31.

Parkin, E. A., and R. Forster. 1965. Increased resistance of stored-product insects to insecticides. The maize weevil and lindane. *Pest Infestation Research* 1964: 33.

Parkin, E. A., and R. Forster. 1966. Increased resistance of stored-product insects to insecticides. The maize weevil and lindane. *Pest Infestation Research* 1965: 40.

Parkin, E. A., and R. Forster. 1968. Increased resistance of stored-product insects to insecticides. The maize weevil and lindane. *Pest Infestation Research* 1967: 34.

Parkin, E. A., E. I. C. Scott, and R. Forster. 1961. Increased resistance of insects to contact insecticides. *Sitophilus oryzae* and *S. sasakii*. *Pest Infestation Research* 1960: 37.

Parkin, E. A., E. I. C. Scott, and R. Forster. 1962. Increased resistance of stored-product insects to insecticides. The resistance of field strains of beetles. *Pest Infestation Research* 1961: 34-35.

Pasalu, I. C., G. K. Girish, and K. Krishnamurthy. 1974. Part I. Status of insecticide resistance in insect pests of stored products. *Bulletin of Grain Technology* 12: 50-59.

Pieterse, A. H., and G. G. M. Schulten. 1974. Investigation on insecticide resistance in *Tribolium castaneum* (Herbst), *T. confusum* Duv. and *Sitophilus zeamais* Motsch. in small maize cribs in Malawi. *Tropical Agriculture (Trinidad)* 51: 63-67.

Scott, E. I. C. 1960. Increased resistance of insects to contact insecticides. The rice weevil and lindane. *Pest Infestation Research* 1959: 25.

Scott, E. I. C. 1961. Increased resistance of insects to contact insecticides. The rice weevil and lindane. *Pest Infestation Research* 1960: 36-37.

Scott, E. I. C., and R. Forster. 1962. Increased resistance of stored-product insects to insecticides. The rice weevil and lindane. *Pest Infestation Research* 1961: 34.

Taylor, T. A., R. I. Egwuatu, and W. H. Boshoff. 1978. Significant infestation by *Araecerus fasciculatus* Degeer (Coleoptera, Anthribidae), following treatment of maize with pirimiphos-methyl for weevil control. *Journal of Stored Products Research* 14: 159-161.

Wallbank, B. E., and H. G. Greening. 1976. Insecticide resistance in grain insects. *Agricultural Gazette of New South Wales* 87: 29-31. (RAE 65: 4069)

Wang, S. C., and T. Y. Ku. 1982. Status of maize weevil resistance to insecticides in Taiwan [in Chinese, English summary]. *Plant Protection Bulletin, Taiwan* 24: 59-68. (RAE 70: 7276)

Wang, S. C., F. Sun, and T. Y. Ku. 1982. Effect of insecticides on the resistance and the reproductive rate in maize weevil (*Sitophilus zeamais* Motschulsky) [in Chinese, English summary]. *Plant Protection Bulletin, Taiwan* 24: 143-151. (RAE 71: 1593)

DAMAGE TO STORED PRODUCTS

Adams, J. M. 1976. Weight loss caused by development of Sitophilus zeamais Motsch. in maize. *Journal of Stored Products Research* 12: 269-272.

Adem, E., and H. Bourges. 1981. Changes in the concentration of some components of corn grain infested with Prostephanus truncatus Horn, Sitophilus zeamais Mots, or Sitotroga cerealella Oliver [in Spanish]. *Archivos Latinoamericanos de Nutricion* 31: 270-286. (BA 47: 102372)

Anonymous. 1983. Grain heating caused by pests and moulds. Leaflet, Ministry of Agriculture, Fisheries and Food, UK. No. 404. 6 pp. (RAE 72: 2461)

Bitran, E. A., T. B. Campos, and D. A. Oliveira. 1978. Experimental evaluation of the damage caused by pests in stored maize under confined conditions. 1 - Sitophilus zeamais Motschulsky, 1855 (Coleoptera, Curculionidae) [in Portuguese, English summary]. *Arquivos do Instituto Biológico, São Paulo* 45: 223-227. (RAE 68: 591)

Bourges, H., and E. Adem. 1983. Effect of infestation by Prostephanus truncatus Horn, Sitophilus zeamais Mots, and Sitotroga cerealella Oliver, on corn protein amino acid concentration [in Spanish]. *Archivos Latinoamericanos de Nutricion* 33: 83-95. (BA 48: 97665)

Lima, C. P. F. de. 1979. The assessment of losses due to insects and rodents in maize stored for subsistence in Kenya. *Tropical Stored Products Information* 38: 21-26.

McMillian, W. W., N. W. Widstrom, and B. R. Wiseman. 1976. Yield losses in south Georgia field corn resulting from damage by several insects. *Journal of the Georgia Entomological Society* 11: 208-211.

Waquil, J. M., and O. Nakano. 1979. Evaluation of damage by Sitophilus zeamais Motschulsky 1855 in sorghum grains with glumes, whole grains and broken grains in laboratory conditions [in Portuguese, English summary]. *Anais da Sociedade*

Entomologica do Brasil 8: 63-75. (RAE 68: 5811)

DISEASE TRANSMISSION

Cravedi, P., and S. Quaroni. 1982. Ways and means of spreading microorganisms in foodstuffs through the activity of insects [in Italian, English summary]. Pages 167-172 in 3° Simposio sulla difesa antiparassitaria nelle industrie alimentari e la protezione degli alimenti. Camera di Commercio Industria Artigianato e Agricoltura. (RAE 72: 6709)

LaPrade, J. C., and A. Manwiller. 1977. Relation of insect damage, vector, and hybrid reaction to aflatoxin B₁ recovery from field corn. *Phytopathology* 67: 544-547.

McMillian, W. W., N. W. Widstrom, and D. M. Wilson. 1981. Rearing the maize weevil on maize genotypes when aflatoxin-producing Aspergillus flavus and A. parasiticus isolates were present. *Environmental Entomology* 10: 760-762.

McMillian, W. W., N. W. Widstrom, D. M. Wilson, and R. A. Hill. 1980. Transmission by maize weevils of Aspergillus flavus and its survival on selected corn hybrids. *Journal of Economic Entomology* 73: 793-794.

GENERAL PAPERS

Anonymous. 1975. Grain weevils. Ministry of Agriculture, Fisheries and Food, U.K. Advisory Leaflet No. 219. 6 pp. (RAE 65: 417)

Coursey, D. G. 1967. Yam storage - I: a review of yam storage practices and of information on storage losses. *Journal of Stored Products Research* 2: 229-244.

Goodyer, G. 1982. Insect pests of maize. Agfacts No. P3.AE.2. 6 pp. (RAE 72: 2869)

Haines, C. P. 1982. Pest management in stored products. *Protection Ecology* 4: 321-330.

Hindmarsh, P. S. 1976. Reduction of post-harvest losses to durable produce in Zambia. *Tropical Stored Products Information* 31: 13-15.

Mould, H. A. 1973. Grain storage in Ghana. Tropical Stored Products Information 25: 44.

Olalquiaga, F. G. 1980. Phytosanitary features of Easter Island [in Spanish]. Revista Chilena de Entomología 10: 101-102. (RAE 70: 6377)

Pattinson, I. 1969. The National Agricultural Products Board, Tanganyika. Part 2: storage problems. Tropical Stored Products Information 17: 23-31.

Tanyongana, R. 1983. Entomology notes: the maize weevil. Zimbabwe Agricultural Journal 80: 81-82. (BA 48: 97924)

Watt, M. J. 1965. Notes on pests of stored grain; Liposcelis bostrychophilus and Sitophilus spp. Agricultural Gazette of New South Wales 76: 693-696. (BA 30: 39082)

Womack, H. 1984. Insect problems associated with stored peanuts in Georgia - USA. Pages 723-725 in Proceedings of the Third International Working Conference on Stored-Product Entomology. Manhattan, Kansas, USA. October 23-28, 1983.

MORPHOLOGY AND PHYSIOLOGY

Almeida, J. R. de, Y. Mizuguchi, and S. B. de Almeida. 1979. Isoesterases of stored products pests: Sitotroga cerealella (Olivier, 1819), Sitophilus zeamais (Motschulsky, 1855) and Tribolium castaneum (Herbst, 1797) [in Portuguese, English summary]. Anais da Sociedade Entomologica do Brasil 8: 251-255. (RAE 70: 5773)

Baker, J. E. 1982. Digestive proteinases of Sitophilus weevils (Coleoptera: Curculionidae) and their response to inhibitors from wheat and corn flour. Canadian Journal of Zoology 60: 3206-3214.

Baker, J. E. 1983. Properties of amylases from midguts of larvae of Sitophilus zeamais and Sitophilus granarius. Insect Biochemistry 13: 421-428.

Baker, J. E., and S. M. Woo. 1985. Purification, partial characterization, and postembryonic levels of

amylases from Sitophilus oryzae and Sitophilus granarius. Archives of Insect Biochemistry and Physiology 2: 415-428.

Baker, J. E., S. M. Woo, D. R. Nelson, and C. L. Fatland. 1984. Olefins as major components of epicuticular lipids of three Sitophilus weevils. Comparative Biochemistry and Physiology 77B: 877-884.

Beiras, M. J., and E. Petitpierre. 1981. Allozymic variability and genetic differentiation in three species of Sitophilus L. (Coleoptera, Curculionidae). Egyptian Journal of Genetics and Cytology 10: 95-104. (RAE 70: 5050)

Brown, J. J., and G. M. Chippendale. 1975. Survival of the adult maize weevil, Sitophilus zeamais: role of nutrients, larval reserves and symbionts. Comparative Biochemistry and Physiology 50A: 83-90.

Evans, D. E. 1979. The effect of thermal acclimation and relative humidity on the oxygen consumption of three Sitophilus species. Journal of Stored Products Research 15: 87-93.

Ganesalingam, V. K. 1974. Morphological studies on the differentiation in the ovary of the adult Sitophilus zeamais Motschulsky (Coleoptera: Curculionidae). Ceylon Journal of Science, Biological Sciences 11: 1-8.

Ganesalingam, V. K. 1975. Structure and development of the testes in the adult Sitophilus zeamais Motschulsky (Coleoptera: Curculionidae). Ceylon Journal of Science, Biological Sciences 11: 70-76. (RAE 64: 4015)

Halstead, D. G. H. 1963. External sex differences in stored-products Coleoptera. Bulletin of Entomological Research 54: 119-134.

Khan, N. R., and A. J. Musgrave. 1968. Some anatomical differences of possible taxonomic value in the female reproductive organs of Sitophilus (Curculionidae: Coleoptera). Canadian Entomologist 100: 1226-1228.

Khan, N. R., and A. J. Musgrave. 1969. Observations on the functional anatomy of the reproductive organs of Sitophilus (Coleoptera: Curculionidae). Canadian Journal of Zoology 47: 665-669.

McLaurin, B. F., Jr., and A. E. R. Downe. 1966. Serological comparison of three species of grain infesting weevils (Curculionidae: Sitophilus). Journal of the Kansas Entomological Society 39: 500-505. (RAE 56: 383)

Nakakita, H. 1976. Mitochondria of maize weevil (Sitophilus zeamais (M.)). I. Isolation, respiratory function and morphology of adult maize weevil mitochondria. Applied Entomology and Zoology 11: 229-238.

Nelson, D. R., C. L. Fatland, and J. E. Baker. 1984. Mass spectral analysis of epicuticular n-alkadienes in three Sitophilus weevils. Insect Biochemistry 14: 435-444.

Nigam, P. C., and A. J. Musgrave. 1964. Effect of DDT and starvation on the antigenic composition of Sitophilus granarius (L.) (Coleoptera), GG strain, and a comparison with other strains and species, using the Ouchterlony technique. Canadian Journal of Zoology 42: 1041-1048.

Qureshi, A. H. 1968. Sexual dimorphism in Sitophilus zeamais Motschulsky. Agriculture Pakistan 19: 237-239.

Tolpo, N. C., and E. O. Morrison. 1965. Sex determination by snout characteristics of Sitophilus zeamais Motschulsky. Texas Journal of Science 17: 122-124.

Williams, J. H., and D. A. Wilbur. 1968. Respiratory environments of grain-infesting weevils. I. Comparison of culture-jar and laboratory rearing-room atmospheres. Journal of Economic Entomology 61: 345-348.

Williams, J. H., and D. A. Wilbur. 1969. Respiratory environments of grain-infesting weevils. II. Comparison of respiratory atmospheres produced by laboratory populations of three species of grain weevils. Journal of Economic Entomology 62: 693-697.

MYCETOMAL SYMBIOTES

Morris, G. W. 1979. An attempt to produce aposymbiotic Sitophilus zeamais (Coleoptera: Curculionidae) by rearing at 33°C. Proceedings of the Entomological Society of Ontario 110: 107-109. (RAE 69: 4282)

Morris, G. W. 1979. Microbial isolations from Sitophilus zeamais (Coleoptera: Curculionidae). Proceedings of the Entomological Society of Ontario 110: 93-96. (RAE 69: 4281)

Musgrave, A. J., and I. Grinyer. 1968. Membranes associated with the disintegration of mycetomal micro-organisms in Sitophilus zeamais (Mots.) (Coleoptera). Journal of Cell Science 3: 65-70.

Musgrave, A. J., and R. Homan. 1962. Sitophilus sasakii (Tak.) (Coleoptera: Curculionidae) in Canada: anatomy and mycetomal symbiotes as valid taxonomic characters. Canadian Entomologist 94: 1196-1197.

Nardon, P., and C. Wicker. 1981. Symbiosis in the genus Sitophilus (Coleoptera: Curculionidae). Principal morphological, physiological and genetic aspects [in French]. Annee Biologique 20: 327-373. (RAE 70: 3753)

Yadava, R. P. S., and A. J. Musgrave. 1972. Phospholipid patterns of two symbiote harbouring weevils, the rice weevil, Sitophilus oryzae L., and the corn weevil, Sitophilus zeamais (Mots.) (Coleoptera: Curculionidae). Comparative Biochemistry and Physiology 42B: 197-200.

Yadava, R. P. S., A. J. Musgrave, and J. B. M. Rattray. 1973. Fatty acid composition of different lipid classes in two symbiotic weevils, Sitophilus oryzae L. and Sitophilus zeamais (Mots.) (Coleoptera: Curculionidae). Comparative Biochemistry and Physiology 46B: 839-845.

SURVEYS

Adesuyi, S. A. 1966. A survey of insect pests on stored dried yam and an investigation of the biology of the important species. Pages 95-99 in Nigerian Stored Products Research Institute Annual Report 1965.

Adesuyi, S. A. 1979. The problems of insect infestation of stored dried yam chips in Nigeria. Pages 314-319 in Proceedings of the Second International Working Conference on Stored-Product Entomology. Ibadan, Nigeria. September 10-16, 1978.

Bahr, I., and W. Prinz. 1977. Insects in stored grain in the German Democratic Republic and the prevention of damage [in German, English summary]. Nachrichtenblatt für den Pflanzenschutz in der DDR 31: 200-204. (RAE 66: 3259)

Chagas, E. F. das, I. P. Coelho, and F. J. O. Rodrigues. 1982. Noxious insects of Maranhao. 1. Entomofauna of stored food products [in Portuguese, English summary]. Anais da Sociedade Entomologica do Brasil 11: 221-226. (RAE 72: 1187)

Chesnut, T. L., and W. A. Douglas. 1971. Competitive displacement between natural populations of the maize weevil and the Angoumois grain moth in Mississippi. Journal of Economic Entomology 64: 864-868.

Danon, M., M. Maceljski, and Z. Korunic. 1969. The maize weevil (Sitophilus zeamais Motsch.) a new pest of maize in Yugoslavia. Savremena Poljoprivreda 17: 625-634. (RAE 58: 1704)

Ganesalingam, V. K. 1976. A study of insects in four rice stores in the Kandy district in Sri Lanka. Ceylon Journal of Science, Biological Sciences 12: 30-46.

Giles, P. H. 1964. The insect infestation of sorghum stored in granaries in northern Nigeria. Bulletin of Entomological Research 55: 573-588.

Giles, P. H. 1965. A record of stored product insects associated with northern Nigerian foodstuffs. Samaru Miscellaneous Paper Number 8. 7 pp.

Greening, H. G. 1979. Observations on the occurrence of insect pests of stored grain in New South Wales. Pages 15-22 in D. E. Evans, ed. Australian contributions to the symposium on the protection of grain against insect damage during storage. Moscow. 1978. CSIRO, Canberra.

Horton, P. M. 1982. Stored product insects collected from on-farm storage in South Carolina. Journal of the Georgia Entomological Society 17: 485-491.

Hsieh, F. K., L. M. Hung, S. S. Kao, and S. L. Hus. 1980. Estimates of losses of stored rice caused by insects [in Chinese, English summary]. Plant Protection Bulletin, Taiwan 22: 385-395. (RAE 70: 2988)

Ivbijaro, M. F. 1979. The deterioration of commercial maize (Zea mays) by insects and fungi. Pages 309-312 in Proceedings of the Second International Working Conference on Stored-Product Entomology. Ibadan, Nigeria. September 10-16, 1978.

Ivbijaro, M. F., E. O. Osisanya, and E. E. Akinlade. 1979. The deterioration of commercial maize (Zea mays) by insects and fungi. International Biodeterioration Bulletin 15: 74-76.

Kiritani, K. 1965. Insect infestation of stored rice in Japan. Pages 630-631 in Proceedings of the XI1th International Congress of Entomology. London. 8-16 July, 1964.

Kirk, V. M. 1970. A list of the beetles of South Carolina. Part 2 - Mountain, Piedmont, and Southern Coastal Plain. South Carolina Agricultural Experiment Station Technical Bulletin Number 1038. 117 pp.

Libby, J. L. 1968. A maize insect field study. Nigerian Entomologists' Magazine 1: 91-94. (RAE 58: 885)

Martins Entrudo, M., Jr., and J. A. Monteiro Guimaraes. 1964. On some of the principal pests of granaries in Portugal [in Portuguese]. Agricultura (Lisbon) 22: 33-35. (RAE 54: 387)

Mills, R. B., and R. R. Rodriguez. 1977. Stored grain insects attacking maize on the Yucatan Peninsula [Abstract]. Journal of the Kansas Entomological Society 50: 530.

Morrison, E. O. 1964. A survey on the distribution of the rice weevil complex, Sitophilus spp., infesting stored grain in Texas and a check-list of other stored grain insect pests encountered. Texas Journal of Science 16: 90-95.

Mostafa, S. A. S., A. I. Dabbour, M. A. Nassif, and M. I. A. Aziz. 1981. Insects damaging stored products in Saudi Arabia [in German, English summary]. *Anzeiger für Schädlingskunde Pflanzenschutz Umweltschutz* 54: 184-187. (RAE 70: 4217)

Nyira, Z. M. 1970. Infestation of cereals and pulses in the field by stored products insects and two new records of stored products Coleoptera in Uganda. *East African Agricultural and Forestry Journal* 35: 411-413. (RAE 59: 1819)

Osuji, F. N. C. 1980. Observations on beetles attacking dried yams and yam flour from three Nigerian markets. *Tropical Stored Products Information* 39: 35-38.

Parker, B. L., R. H. Booth, and C. P. Haines. 1981. Arthropods infesting stored cassava (Manihot esculenta Crantz) in peninsular Malaysia. *Protection Ecology* 3: 141-156.

Peng, W. K., S. J. Hsu, and K. C. Liao. 1979. Investigation on Sitophilus in rice-storage houses in Taiwan and on their discrimination. NTU (National Taiwan University) *Phytopathologist and Entomologist* 6: 44-52. (RAE 68: 4677)

Pinheira, M. F. V. 1968. The arthropods attacking cashew nuts in warehouses and factories. Some information for studies on them. *Garcia de Orta* 16: 293-307. (RAE 60: 1476)

Russell, M. P. 1962. Field infestation of corn in Indiana by the Angoumois grain moth and a rice weevil. *Journal of Economic Entomology* 55: 814-815.

Santoro, F. H. 1967. Insects of stored grain that attack wheat and maize in the field [in Spanish]. *Idia* 240: 63-72. (RAE 57: 1819)

Schmutterer, H. 1971. Contribution to the knowledge of the crop pest fauna in Ethiopia. *Zeitschrift für Angewandte Entomologie* 67: 371-389. (RAE 62: 1827)

Schulzen, G. G. M. 1975. Losses in stored maize in Malawi (C. Africa) and work undertaken to prevent them. *Bulletin Organisation Europeenne et Mediterraneenne pour la Protection des Plantes* 5: 113-120.

Sinclair, E. R. 1982. Population estimates of insect pests of stored products on farms on the Darling Downs, Queensland. *Australian Journal of Experimental Agriculture and Animal Husbandry* 22: 127-132.

Singh, K. N., R. K. Agrawal, and P. K. Srivastava. 1978. Infestation of grain moth Sitotroga cerealella Oliv. and maize weevil Sitophilus zeamais Mots. on standing crops in the field. *Bulletin of Grain Technology* 16: 125-127.

Walker, D. J. 1979. Insects associated with stored maize and other harvested food crops in Swaziland. *Journal of the Entomological Society of Southern Africa* 42: 331-335. (RAE 68: 4662)

Wohlgemuth, R., and C. Reichmuth. 1983. Summary of surveys of the infestation of imported goods by stored-product pests on entry into the German Federal Republic during the years 1975/76 to 1979 [in German]. *Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft, Berlin-Dahlem*. No. 212. 156 pp. (RAE 72: 2431)

Yoshida, T., and K. Kawano. 1959. Fauna and community structure of the insects in the grain stored at farm-houses. The ecological studies of the pests infesting stored grains. Part 3 [in Japanese, English summary]. *Memoirs of the Faculty of Liberal Arts and Education, Miyazaki University, Natural Science* 7: 33-61.

TAXONOMY

Boudreaux, H. B. 1969. The identity of Sitophilus oryzae. *Annals of the Entomological Society of America* 62: 169-172.

Floyd, E. H., and L. D. Newsom. 1959. Biological study of the rice weevil complex. *Annals of the Entomological Society of America* 52: 687-695.

Frey, W. 1962. Contributions to the knowledge of quarantine pests in the field of storage pest control. II. The difference between the rice weevil

(*Sitophilus oryzae* L.) and the maize weevil (*Sitophilus zea-mais* Motsch.) [in German]. Nachrichtenblatt des Deutschen Pflanzenschutzdienstes (Braunschweig) 14: 145-149.

Halstead, D. G. H. 1962. The rice weevils, *Sitophilus oryzae* (L.) and *Sitophilus zeamais* Mots.; identification and synonymy. Tropical Stored Products Information 5: 177-179.

Halstead, D. G. H. 1964. The separation of *Sitophilus oryzae* (L.) and *S. zeamais* Motschulsky (Col., Curculionidae), with a summary of their distribution. Entomologist's Monthly Magazine 99: 72-74.

Horng, S. B., and W. K. Peng. 1983. Morphological comparison of pronotum and scutellum between rice weevil and maize weevil [in Chinese, English summary]. NTU (National Taiwan University) Phytopathologist and Entomologist 10: 39-46. (RAE 73: 3753)

Hossain, M., and P. H. Verner. 1979. Larvae of three species of *Sitophilus* (Coleoptera: Curculionidae). Bangladesh Journal of Zoology 7: 45-51.

Hunkapiller, P. D., and A. E. O'Donnell. 1967. A taxonomic separation of larvae of the genus *Sitophilus* by head capsule morphology (Coleoptera: Curculionidae). Journal of the Kansas Entomological Society 40: 435-440.

Kuschel, G. 1961. On problems of synonymy in the *Sitophilus oryzae* complex (30th contribution, Col. Curculionoidea). Annals and Magazine of Natural History Ser. 13/4: 241-244.

Kuschel, G. 1978. Notes on the identity of *Sitophilus zeamais* Motschulsky based on type material examination. Journal of Natural History 12: 231.

Maceljski, M., and Z. Korunic. 1971. A further contribution to knowledge of the morphology of the maize weevil (*Sitophilus zeamais* Motsch.) [in Serbo-Croat, English summary]. Zastita Bilja 22: 33-41. (RAE 61: 4289)

Morrison, E. O. 1964. Taxonomy of the rice weevils, *Sitophilus oryzae* (L.) and *S. zea-mais* Motschulsky and an annotated bibliography relevant to the ecology of the species. Texas Journal of Science 16: 243-253.

Motschulsky, V. 1855. Notice - *Sitophilus granarius* et *Sitophilus oryzae*. Etudes Entomologiques 4: 77-78.

Proctor, D. L. 1971. An additional aedeagal character for distinguishing *Sitophilus zeamais* Motsch. from *Sitophilus oryzae* (L.) (Coleoptera, Curculionidae). Journal of Stored Products Research 6: 351-352.

Schmidt, M. 1923. Die morphologischen Unterschiede von *Calandra oryzae* L. und *Calandra zeamais* Motsch. (*plantensis* Zacher). Arbeiten aus der Biologischen Reichsanstalt 12: 233-235.

Yang, C. T. 1976. Discussion on the scientific name of the rice weevil [in Chinese, English summary]. Plant Protection Bulletin, Taiwan 18: 250-253. (RAE 65: 5198)

Zumpt, F. 1935. Revision der europäischen *Calandra*-Arten. Curculioniden-Studien XII. Entomologische Blätter 31: 55-59. (RAE 23: 348-349)

AUTHOR INDEX^{1/}

A

Adams, J. M. - 22
Adem, E. - 22(2x)
Adesuyi, S. A. - 8(2x), 12(2x), 14, 18, 24, 25
Adeyemi, S. A. - 10
Adeyemi, S. A. O. - 12(2x)
Agrawal, R. K. - 26
Akibo-Betts, D. T. - 15
Akinlade, E. E. - 25
All, J. N. - 5
Almeida, J. R. de - 23
Almeida, S. B. de - 23
Anonymous - 22(2x)
Arakaki, N. - 3(2x)
Araujo, J. B. M. - 9(5x), 12(5x)
Arbogast, R. T. - 6
Arcozzi, L. - 5
Arnason, J. T. - 15
Arruda, H. V. de - 7
Ashman, F. - 5, 8(2x), 13
Ashton, G. C. - 6
Atarasi, N. - 6
Attia, F. I. - 20
Ayertey, J. N. - 4(4x)
Aziz, M. I. A. - 26

B

Bahr, I. - 25
Bailey, S. W. - 17
Baker, J. E. - 4, 23(4x), 24
Barth, R. - 14
Basson, A. J. - 11
Beeman, R. W. - 14
Beer, P. R. de - 11
Beiras, M. J. - 23
Bell, C. H. - 12
Benazet, J. - 11
Bennett, R. G. - 4
Bergamo, M. A. - 19
Bernabe-Adalla, C. - 14(2x)
Bernardo, E. N. - 14(2x)
Betanzos Mendoza, E. - 14
Bhatia, S. K. - 14
Birch, L. C. - 4(6x)

Bishara, S. I. - 4(3x), 14
Bitran, E. A. - 8(2x), 9(13x), 12(9x), 22
Boles, H. P. - 4
Booth, R. H. - 26
Boshoff, W. H. - 21
Boudreaux, H. B. - 26
Bourges, H. - 22(2x)
Bransby-Williams, W. R. - 14
Brower, J. H. - 19
Brown, G. A. - 19
Brown, J. J. - 23
Brun, L. O. - 20
Bry, R. E. - 5
Burkholder, W. E. - 3(4x)

C

Caetano, W. - 14
Camargo, A. A. - 19
Campos, T. B. - 8(2x), 9(13x), 12(7x), 22
Carino, F. O. - 9, 11
Chagas, E. F. das - 25
Champ, B. R. - 18, 20(3x)
Chen, C. W. - 3
Chen, W. G. - 19
Chesnut, T. L. - 4(2x), 18, 25
Chiba, S. - 8, 9(3x)
Chippendale, G. M. - 23
Chuan, L. - 17
Coelho, I. P. - 25
Coetzer, J. J. - 11, 13(2x)
Coombs, C. W. - 4
Cornes, M. A. - 10, 12(4x)
Cornwell, P. B. - 19
Coursey, D. G. - 22
Cowley, R. J. - 5
Cravedi, P. - 22
Cribb, J. N. - 20

D

Dabbour, A. I. - 26
Damasco-Verbo, E. - 10
Danon, M. - 25

^{1/}Numbers in parentheses indicate the number of citations by the author on that page.

Davis, F. M. - 14
Davis, R. - 5, 12, 13, 14(2x)
Diaz Castro, G. - 14, 15
Dix, D. E. - 5
Dobie, P. - 5, 14(2x), 15(3x)
Domarco, R. E. - 20
Donnelly, J. - 10
Douglas, W. A. - 4, 18, 25
Downe, A. E. R. - 24
Drapala, W. J. - 14
Dunkel, F. - 17
Dyte, C. E. - 20(5x)

E

Edwards, J. P. - 14
Egwuatu, R. I. - 21
Estefanel, V. - 15
Evans, D. E. - 23
Evans, N. J. - 20

F

Fales, H. M. - 3(2x)
FAO - 20(2x)
Fatland, C. L. - 23, 24
Faustini, D. L. - 3
Floyd, E. H. - 5(2x), 6, 8(2x), 18(2x), 26
Forster, R. - 21(8x)
Fortier, G. - 15
Foster, J. E. - 16(2x)
Fourie, G. J. J. - 5
Frey, W. - 26
Fukami, J. I. - 18

G

Ganesalingam, V. K. - 23(2x), 25
Garrido, M. G. - 10
Gebrekidan, B. - 15
Gelosi, A. - 5
Giles, P. H. - 5(2x), 25(2x)
Gillenwater, H. B. - 12, 13, 14(2x)
Girish, G. K. - 19(2x), 21
Golob, P. - 18
Goodship, G. - 12
Goodyer, G. - 22
Green, A. A. - 20
Greening, H. G. - 21, 25
Grinyer, I. - 24

H

Hagstrum, D. W. - 5
Haines, C. P. - 22, 26

Halid, H. - 5
Halstead, D. G. H. - 23, 27(2x)
Hanson, W. D. - 17
Harris, A. H. - 13
Hayashi, N. - 3
Hendricks, L. H. - 14
Hill, R. A. - 22
Hindmarsh, P. S. - 10, 22
Hodges, R. J. - 5
Hojo, H. - 8
Hole, B. D. - 12, 21
Holscher, C. E. - 11
Homan, R. - 6, 24
Honda, H. - 3(3x)
Hoover, D. L. - 5
Horber, E. - 16(4x)
Horng, L. M. - 13
Horng, S. B. - 27
Horton, P. M. - 21, 25
Hossain, M. - 27
Howard, D. C. - 5
Howe, R. W. - 5, 13
Hsia, W. T. - 15
Hsieh, F. K. - 5(3x), 10(2x), 19, 25
Hsieh, G. C. - 10
Hsu, S. J. - 26
Hsu, S. L. - 10(2x)
Hung, L. M. - 5, 10, 25
Hunkapiller, P. D. - 27
Hus, S. L. - 25
Hutchinson, M. T. - 17
Hwang, J. S. - 5(3x)

I

Imura, O. - 5
Ishikura, H. - 10
Ishizaki, T. - 9
Ivbijaro, M. F. - 15, 19, 25(2x)
Iyatomi, K. - 13

J

Javier, P. A. - 15
Jay, E. - 17
Jiang, X. L. - 17
Jin, L. Z. - 19
Juliano, B. O. - 15

K

Kao, S. S. - 5, 19, 25
Kastrup, L. F. C. - 9
Kawano, K. - 26
Khan, M. A. - 5

Khan, N. R. - 23(2x)
 Kidoguchi, J. - 6
 Kilminster, A. M. - 15
 Kilminster, K. M. - 11
 Kiritani, K. - 6(5x), 25
 Kirk, V. M. - 6, 25
 Kirkpatrick, R. L. - 10
 Klein, J. A. - 3
 Kockum, S. - 10
 Komae, H. - 3
 Korunic, Z. - 6, 25, 27
 Kramer, K. J. - 14(2x)
 Krishnamurthy, K. - 21
 Ku, T. Y. - 11, 21(2x)
 Kumagai, M. - 19
 Kung, K. S. - 5
 Kuschel, G. - 27(2x)

L
 LaHue, D. W. - 10(3x)
 Lambert, J. D. H. - 15
 LaPrade, J. C. - 22
 Lazzarini, S. - 12
 LeCato, G. L. - 6
 Leesch, J. G. - 13, 14(2x)
 Legg, D. E. - 3
 Lemon, R. W. - 10(2x)
 Liao, K. C. - 26
 Libby, J. L. - 25
 Lima, C. P. F. de - 10(2x), 13, 17, 21, 22
 Lima, J. O. G. de - 15
 Lin, T. - 13
 Link, D. - 15
 Longstaff, B. C. - 6
 Lung, P. Z. - 17

M
 Ma, M. - 3(2x)
 Mabie, J. M. - 4
 Macdonald, I. A. - 10
 Maceljski, M. - 6(2x), 25, 27
 Maeshima, K. - 3
 Manwiller, A. - 22
 Martins Entrudo, M., Jr. - 25
 Matsuzawa, H. - 6
 McDonald, L. L. - 12, 14(2x)
 McFarlane, J. A. - 6
 McGregor, H. E. - 14
 McLaurin, B. F., Jr. - 24
 McMillian, W. W. - 17(5x), 22(3x)
 McNeill, J. - 15
 Meagher, R. L., Jr. - 6
 Meik, J. - 5

Mendonca, P. P. de - 12
 Mhango, V. - 18
 Mikolajczak, K. L. - 3
 Mills, K. A. - 12, 20
 Mills, R. B. - 6, 7, 8(3x), 15, 16(6x), 25
 Mizuguchi, Y. - 23
 Mizuno, H. - 8
 Monte, G. dal - 19
 Monteiro Guimaraes, J. A. - 25
 Morales, A. C. - 15
 Morallo-Rejesus, B. - 7, 9, 10(2x), 11(2x), 15
 Morris, G. W. - 24(2x)
 Morrison, E. O. - 6(2x), 24, 25, 27
 Moss, C. S. - 10, 15
 Mostafa, S. A. S. - 26
 Motschulsky, V. - 27
 Mould, H. A. - 23
 Murakami, T. - 3
 Musgrave, A. J. - 6, 23(2x), 24(5x)
 Mwambula, J. - 18

N
 Nagai, V. - 16
 Nakakita, H. - 13(2x), 24
 Nakano, O. - 22
 Nardon, P. - 24
 Nassif, M. A. - 26
 Nelson, D. R. - 23, 24
 Nerona, E. H. - 11
 Newsom, L. D. - 26
 Ngulube, F. - 18
 Ni, Z. Z. - 13
 Nigam, P. C. - 24
 Nishigaki, J. - 6
 Nozzolillo, C. - 15
 Nwana, I. E. - 15
 Nwankwo, F. I. - 15
 Nwogu, E. O. - 15
 Nyiira, Z. M. - 26

O
 O'Donnell, A. E. - 27
 Ofosu, A. - 11, 15
 Ohguchi, Y. - 18
 Ohsawa, K. - 3(2x)
 Okelana, F. A. - 6
 Olalquiaga, F. G. - 23
 Oliveira, D. A. - 9(12x), 12(5x), 22
 Oliveira, M. L. de - 15, 16
 Ortega, C. A. - 10, 17(2x)
 Oshima, K. - 3
 Osisanya, E. O. - 25

Osuji, F. N. C. - 6, 26
Oyeniran, J. O. - 12
Ozaki, K. - 10

P

Pacheco, J. M. - 20
Painter, H. - 16
Painter, R. H. - 17
Pan, X. F. - 19
Parker, B. L. - 26
Parkin, E. A. - 11, 21(8x)
Partida, G. J. - 8, 11
Pasalu, I. C. - 21
Pattinson, I. - 23
Pedersen, J. R. - 8
Peng, W. K. - 11, 15, 26, 27
Pereira, J. - 19
Pesson, P. - 19(2x)
Petitpierre, E. - 23
Phillips, J. K. - 3(3x)
Philogene, B. J. R. - 15
Pieterse, A. H. - 21
Pigati, P. - 9, 12
Pimentel, M. L. - 15, 16
Pinheira, M. F. V. - 26
Pinniger, D. B. - 20
Porter, J. E. - 4
Powell, J. D. - 6
Price, N. R. - 20
Prinsloo, S. - 11
Prinz, W. - 25
Proctor, D. L. - 6, 13, 27

Q

Quaroni, S. - 22
Qureshi, A. H. - 11(3x), 12, 13, 19, 24

R

Ramalho, F. S. - 15
Ramos-Elorduy de Conconi, J. - 18
Rattray, J. B. M. - 24
Redlinger, L. M. - 10, 12, 13, 14(2x),
17(3x)
Reed, C. - 6
Rees, D. P. - 5
Rego, A. F. de M. - 15, 16
Reichmuth, C. - 26
Rezende, J. A. M. - 16
Richards, O. W. - 7(2x)
Rink, M. M. - 16
Robinson, R. R. - 16
Rodrigues, F. J. O. - 25
Rodrigues, Z. A. - 15, 16

Rodriquez, J. G. - 3
Rodriguez, R. R. - 25
Rogers, R. R. - 16(2x)
Roller, P. P. - 3
Rossetto, C. J. - 7, 16(2x)
Russell, M. P. - 16(2x), 26

S

Saito, T. - 13(2x)
Santhoy, O. - 7
Santoro, F. H. - 26
Santos, J. P. - 16(2x)
Sarjono, J. - 5
Sato, K. - 13
Satomi, H. - 7(3x)
Sbur, D. E. - 8, 11
Schmidt, M. - 27
Schmuff, N. R. - 3(2x)
Schmutterer, H. - 26
Schoonhoven, A. V. - 16(4x)
Schulten, G. G. M. - 21, 26
Schweder, C. R. - 14
Scott, E. I. C. - 21(5x)
Scott, G. E. - 14
Segrove, F. - 7
Sgrillo, R. B. - 20
Sharifi, S. - 7(2x), 18
Shejbal, J. - 18
Shipp, E. - 20
Short, J. E. - 14
Silva, W. J. da - 7
Simonaitis, R. A. - 10
Sinclair, E. R. - 26
Singh, K. N. - 26
Singh, S. R. - 7, 11
Sinha, R. N. - 16
Smith, L. B. - 7
Smith, R. H. - 5
Soderstrom, E. L. - 7(4x)
Soeda, Y. - 19
Sosa, M. C. - 17(2x)
Spratt, E. C. - 7, 18(2x)
Srivastava, P. K. - 26
Strong, R. G. - 8, 11
Sun, F. - 11, 21
Suwanai, M. - 13
Suzuki, H. - 18

T

Takahashi, F. - 3(3x), 8
Takuma, T. - 8
Tanyongana, R. - 23
Tatsuki, S. - 18
Taylor, R. W. D. - 13

Taylor, T. A. - 8, 21
Tilton, E. W. - 18, 19
Tipping, P. W. - 3
Tolpo, N. C. - 24
Turner, J. W. - 16

U

Ungaro, M. T. S. - 9, 12
Ungsunantwiwat, A. - 8(4x)

V

VanDerSchaaf, P. - 17
Varca, L. M. - 11
Vardell, H. H. - 18
Veiga, A. F. de S. L. - 15, 16
Vermaak, C. - 11
Vermaak, C. J. - 13(2x)
Verner, P. H. - 27
Viljoen, J. H. - 11, 13(2x)
Villacis, S. J. - 17(2x)

W

Walder, J. M. M. - 20
Walgenbach, C. A. - 3(2x)
Walker, D. J. - 26
Wallbank, B. E. - 21
Wang, S. C. - 11, 21(2x)
Waqil, J. M. - 22
Wassom, C. E. - 16(2x)
Watt, M. J. - 23
Watters, F. L. - 20(2x)
Weaving, A. J. S. - 11(3x)
Webley, D. J. - 11, 13
Wheatley, P. E. - 17
Wicker, C. - 24
Widstrom, N. W. - 17(7x), 22(3x)
Wiendl, F. M. - 19, 20
Wilbur, D. A. - 7(3x), 16, 17, 24(2x)
Williams, J. H. - 24(2x)
Williams, J. O. - 18
Williams, R. N. - 8(2x), 18(2x)
Wilson, D. M. - 22(2x)
Wiseman, B. R. - 17(4x), 22
Wiser, W. J. - 17(2x)
Wohlgemuth, R. - 19, 26
Wolfenbarger, D. A. - 11
Womack, H. - 23
Woo, S. M. - 23(2x)
Wu, I. S. - 10

Y

Yabe, T. - 8

Yadava, R. P. S. - 24(2x)
Yamamoto, I. - 3(5x), 19
Yamamoto, R. - 3(5x)
Yang, C. T. - 27
Yasue, Y. - 18
Yerington, A. P. - 19
Yin, H. F. - 17
Yoshida, T. - 8, 18, 26

Z

Zehner, J. M. - 12, 13, 14(2x)
Zettler, J. L. - 10, 12, 14(2x)
Zhang, X. - 19
Zhao, S. H. - 19
Zilkowski, B. W. - 3
Zinsly, J. R. - 16
Zumpt, F. - 27